AN EPISODE APPROACH TO UTILIZATION, COSTS, & EFFECTIVENESS IN HEALTH CARE

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SECTION VIII. HEMORRHOIDS

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ABSTRACT

Episodes of hemorrhoids consisted of contacts for care among person 18 years of age or over where hemorrhoids was a confirmed diagnosis in at least one contact during the episode. Hemorrhoids was classified as a chronic disease, so there was only one episode per person. Four hundred seventy-four episodes of hemorrhoids were identified in this manner.

The mean number of contacts per episode was 2.4, with a maximum of 16 contacts. The mean duration per episode was 194 days. Costs per episode (excluding drug costs) ranged from no costs to $445 with the mean costs per episode being $25.96. There were no costs in 32.4 percent of the episodes.

Seven bundles of care accounted for 65.5 percent of the variation in episode costs. The presence of rubber band ligation accounted for 47.7 percent of the variation with the remaining variation accounted for by the presence of combinations of initial office visits, follow-up office visits, internal or external hemorrhoid surgery, and barium enemas.

Episodes in the higher cost bundles represented a qualitatively different approach to care than episodes in the lower cost bundles of care. Three diagnostic/treatment options were noted: no care, nonsurgical care, surgical care.

The presence of a contact with a surgeon at the index contact was one factor that appeared to determine the intensity of care provided. Among these episodes, 37.4 percent received surgery or ligation. The second factor that strongly

influenced episode resource use was the initial providers judgment whether hemorrhoids was the patient's primary complaint. If so, the patient was likelier to receive follow-up care. Once the decision to treat the condition was made, other patient, provider and medical care process characteristics did not influence treatment or costs.

I. INTRODUCTION

This report summarizes the findings for hemorrhoids. It is based on data from computerized medical records for a 5 percent sample of all subscriber units in the KPMCP between September 30, 1966 and December 31, 1973.

II. DISEASE AND EPISODE DEFINITION

Hemorrhoids are varicosities of the veins of the hemorrhoidal plexus often complicated by inflammation, thrombosis, and/or bleeding. These veins, which lie beneath the mucosa of the anus (external hemorrhoids) and lower rectum (internal hemorrhoids), act as collateral connections between the portal and systemic venous systems. External hemorrhoids are diagnosed by direct inspection, internal hemorrhoids by symptoms and proctoscopy. They are the most common cause of rectal bleeding.

Treatment may be unnecessary in minor cases. In most cases simple therapies such as stool softeners are sufficient. Painful and thrombosed hemorrhoids may be treated by analgesics, heat, cold compresses, rubber band ligation, or surgery.

The hemorrhoid analysis file included all medical care contacts for people 18 years of age or over when the updated diagnosis was hemorrhoids (461.0, International Classification of Diseases, Adapted, 7th edition). An episode began with a patient's first contact with an updated presenting morbidity of hemorrhoids. The episode ended with the patient's last such contact during the study period. At each contact the diagnosis was coded as established, tentative, or unknown.

Episodes were included only when hemorrhoids was coded as an established diagnosis in at least one contact. Using these criteria, there were 474 episodes of hemorrhoids.

These criteria defined an episode of hemorrhoid care within the Health Plan. The disease may have begun before the patient's index contact. During that period, the patient may have been untreated, or may have received treatment within the Health Plan prior to the initiation of the data system, or may have received treatment outside the Health Plan.[1] The final contact marked the end of an episode of care; the disease may persist beyond that time.

III. DESCRIPTION OF THE POPULATION

A. Patient Characteristics

A comorbidity is any condition other than hemorrhoids that was present and diagnosed at the time of any contact for hemorrhoids. Comorbidities were examined because of their potential influence upon the cost of treatment of hemorrhoids. Comorbidities chosen for analysis were pregnancy and anal-rectal diseases, coexisting conditions which could complicate treatment. Table 8-1 shows how comorbidities were defined for this study and shows the frequency of these conditions among the episodes. Most patients, 89.5 percent, had neither anal-rectal disease nor pregnancy during the episode. Anal-rectal

[1]Previous HSRC studies indicate that less than 10 percent of Health Plan members seek medical care outside the Health Plan. Clyde R. Pope, D.K. Freeborn, M.R. Greenlick, Use of Outside Physicians by Members of a Group Practice Prepayment Plan, Health Services Research Center, KPMCP, unpublished report, 1972.

disease was present in 7.6 percent of episodes and, in two-thirds of these, the condition was diagnosed at the index contact. Pregnancy was present in 3 percent of the episodes; all but one of these had pregnancy noted at the index contact. In 5.1 percent of the patients, the presenting morbidity at index contact was a condition (usually, an anal-rectal symptom or non-hemorrhoid disease) which was later updated to hemorrhoids (Table 8-2).

Tables 8-3 and 8-4 describe the presence of symptoms in the episodes. Blood in the stool, a symptom of internal hemorrhoids, was noted in 6.8 percent of the episodes. Of these, all but two episodes had the symptom at the index contact. Anal-rectal pain, swelling, or itching--symptoms of external hemorrhoids--were present in 11 percent of the episodes. No hemorrhoid symptoms were noted in the medical record for 81.9 percent of the total. Nearly 14 percent of patients had other symptoms at the index contact. Most of these had melena ascribed to hemorrhoids.

In 91.8 percent of the patients, the diagnosis of hemorrhoids was established at the first contact. In 8.2 percent of the episodes, the diagnosis at the initial contact was tentative or unknown.

Hemorrhoids was the presenting morbidity, the primary reason for the contact, at the first contact in 52.7 percent of all episodes (Table 8-6). In other episodes hemorrhoids was a secondary finding at a visit for another condition.

Over the entire episode, hemorrhoids was always the presenting morbidity in 43.7 percent, and never the presenting morbidity in 34.6 percent of the episodes.

Mean age at the start of the episode was 43.8 years (Table 8-7). Of the population, 236 were male and 238 were female.

Single contact episodes accounted for 50.4 percent of the episodes; another 25.7 percent lasted from two to 90 days (Table 8-8). Only 16.5 percent of all episodes lasted one or more years. The mean duration of episodes was 194 days. Nearly 94 percent of episodes had not been treated within the Health Plan before the index contact.

B. Provider Characteristics

Table 8-9 shows the specialty of the providers visited by patients at the index contact. A majority of patients, 53.4 percent, visited an internist. Another 37.8 percent, visited surgeons or emergency care surgeons; 6.5 percent visited obstetrician-gynecologists.

The combinations of specialties over the entire episode are shown in Figure 8-1. The most common pattern, followed by 41.6 percent, was to visit only internists; 31.8 percent visited only surgeons; 14.5 percent visited a combination of internists and surgeons; 5.3 percent visited only obstetrician-gynecologists. Of those who visited an internist at the index contact, 20.6 percent visited a surgeon for hemorrhoids later in the episode; 9.7 percent of those who visited

an obstetrician-gynecologist at the index contact later visited a surgeon; and 45.5 percent of those who visited other non-surgical specialty providers at the index contact later visited a surgeon for hemorrhoids.

The frequency distribution of medical office contacts by provider specialty (Table 8-10). Internists and surgeons were the predominant providers of care. The mean number of internist visits per episode was 0.9, with a range of zero to seven; the mean number of surgeon visits per episode was 1.3, with a range of zero to 15.

Table 8-11 shows that 68.1 percent of episodes began with a visit to the patient's regular physician. Another 30.8 percent contacted a temporary attending physician at the index contact, generally as a provider at a walk-in appointment. Only 6.5 percent were referred to a consultant during the episode.

C. Medical Care Process Characteristics

Only 3 percent of episodes included any contacts at which the patient was ineligible for Health Plan benefits. In 9.9 percent the patient sought service at least once outside of regular medical office hours.

The distribution of regularly scheduled appointments and walk-in contacts is shown in Table 8-12. In 56.8 percent, the episode began with a regularly scheduled medical office contact; another 30.6 percent began with a walk-in visit. Walk-in contacts occurred at least once in 41.8 percent of the episodes. The mean number of regularly scheduled medical office

contacts per episodes was 1.5; 45.6 percent of episodes consisted solely of regularly scheduled contacts.

Tables 8-13 and 8-14 show that 37.1 percent were instructed at the index contact to return for further care, usually to the physician or to radiology. The proportion of patients who appeared for a second contact was 50.4 percent, indicating that many contacts were patient initiated. Of the patients instructed at the index contact to return for further care, 25 percent failed to do so.

IV. UTILIZATION DESCRIPTION

A. Types of System Contacts

Table 8-15 shows the frequency distribution for the total number of contacts during a hemorrhoid episode. The number of contacts ranged from one to 16, with a mean of 2.4 per episode.

"Total contacts" included: hospital admissions, outpatient medical office visits, emergency room visits, telephone calls or letters to or from the patient, and a small "other" category. These contacts were counted if hemorrhoids was either the presenting morbidity or an associated morbidity (a finding made during a contact for another condition). The distribution of these types of contacts is given in Table 8-16.

Only 1.7 percent began with a hospital admission, but 5.3 percent included one or more hospitalizations. Most episodes, 87.3 percent, began with a medical office contact; the mean number per episode was 2.0, with a range of zero to 16.

Medical office contacts accounted for 87.7 percent of the contacts. There were emergency room contacts in 6.9 percent of the episodes; telephone or letter contacts were present in 17.1 percent of the episodes.

Table 8-17 shows the frequency distribution of different types of medical office contacts. If the medical office visit was for hemorrhoids as the presenting morbidity, the cost of that contact was counted toward the total cost of care for the hemorrhoid episode, either as a $10 initial office visit or as a $5 follow-up visit. Initial office visits for hemorrhoids occurred in 48.5 percent. Only 35.4 percent had one or more follow-up office visits for hemorrhoids. The mean number of such visits was 0.8 per episode, with a range of zero to 14.

Routine physical examinations were performed in 32.9 percent of episodes. In 15.4 percent of episodes, a physical examination was performed in combination with other types of contacts; in 17.5 percent of episodes, all contacts were physical examinations.

B. Surgery, Diagnostic Procedures, and Drugs

Table 8-18 shows the frequency of office and surgical procedures. The most common procedure was diagnostic proctosigmoidoscopy, performed in 15.2 percent of all episodes. Rubber band ligation of hemorrhoids was done in 11.2 percent of all episodes. Drug related telephone calls appeared in 7 percent of all episodes, and external hemorrhoid surgery was done in 6.8 percent. The combinations of endoscopies, internal or external hemorrhoid surgery, and rubber band ligations

in the episodes is shown in Table 8-19. Neither surgery, ligation, nor endoscopy were performed in 67.3 percent of episodes. Endoscopy was done in 12.9 percent. Internal or external hemorrhoid surgery was given to 7.8 percent. Rubber band ligation alone was given to 6.5 percent, and 5.5 percent received combinations of these procedures.

Table 8-20 shows a frequency distribution for laboratory and radiology procedures. Only 5.3 percent of all episodes had any laboratory procedures coded; these were primarily blood counts and stool blood tests. Radiology procedures were given in 11.4 percent of all episodes; most of these were barium enemas.

There were one or more drug orders in 50.7 percent of all episodes beginning in 1972-1973 (Table 8-21). Local anesthetics were the most common order, in 31.4 percent; two-thirds of these received a local anesthetic drug order without any other drug. Laxatives were given in 19.3 percent; one-half of these received a laxative order without any other drug. Only 5 percent received analgesic orders; 5.7 percent received steroids; and 15 percent received orders of two or more different classes of drugs.

The frequency of key utilization measures at the index contact appears in Table 8-22. The most common procedure was an initial office visit, coded for 43.7 percent of all episodes. Hemorrhoid surgery, if it occurred, was most likely to occur at the index contact. A barium enema was as likely to be given at the index contact as later in the episode.

Telephone calls for drug orders, follow-up office visits, ligation, endoscopy, and laboratory tests were more likely to occur later in the episode.

Data for 1972-73 show that 27.1 percent received local anesthetic orders, 15 percent received laxative orders, and 10 percent received some other class of drug order at the index contact. The service given to a patient at an initial contact was more likely to include a drug order than any diagnostic or surgical procedure. Laxatives and local anesthetics were more likely to be ordered at the index contact than later in the episode.

C. Cost of Episode Management

Table 8-23 shows the distribution of the total outpatient costs of episodes of care of hemorrhoids. The mean dollar cost per episode, exclusive of drug costs, was $25.96; costs ranged from $0 dollars to $445. In 154 episodes, or 32.4 percent of the episodes, there were no services charged to hemorrhoids; all office visits and diagnostic procedures were charged to another presenting morbidity.

The distribution of costs for the index contact is given in Table 8-24. Total costs ranged from $0 to $110, with a mean of $9.01. In 208 episodes, 43.9 percent, no dollar cost was assigned to the index contact. Although the index contacts comprised 43 percent of the contacts in the episodes, they represent 35 percent of mean total episode costs.

D. Summary of Key Descriptive Findings

1. Among episodes of hemorrhoids, 7.6 percent had other anal-rectal diseases; 3.0 percent were pregnant. Symptoms of internal hemorrhoids were present in 6.8 percent of episodes; 11.0 percent had symptoms of external hemorrhoids.

2. In 90.5 percent of the episodes, hemorrhoids was an established diagnosis for all contacts.

3. Over the entire episode, hemorrhoids was the presenting morbidity at all contacts in 43.7 percent of the episodes; it was never the presenting morbidity in 34.6 percent of the episodes.

4. The mean patient age was 43.8 years, and the population was evenly divided between men and women.

5. Episode duration varied from a single contact to 6.5 years. In 50.4 percent of the episodes, there was only one contact; 16.5 percent of the episodes lasted one or more years.

6. Virtually all care was given by physicians. In 41.6 percent of all episodes, care was given only by internists; in 31.8 percent, by surgeons only; in 14.5 percent, by a combination of internists and surgeons. Few patients visited obstetricians or physicians of other specialties during the episode of care. Of those who visited an internist at the index contact, 20.6 percent later visited a surgeon; of those who visited an obstetrician at the index contact, 9.7 percent later visited a surgeon; of those who visited physicians of other specialties at the index contact, 45.5 percent later

visited a surgeon. Few patients were referred to a consultant during the episode.

7. Virtually all patients were eligible for Health Plan coverage at all episode contacts.

8. Most care was given within regular medical office hours. One or more walk-in contacts were present in 41.8 percent of all episodes; 60 percent of the walk-in contacts were at the index contact. At the index contact, 176 patients, 37.1 percent, were instructed by the physician to return for further care. One-fourth of these patients, 44 people, failed to return.

10. The total number of Health Plan contacts during the episode ranged from one to 16, with a mean of 2.4. Most of these, 87.7 percent, were medical office contacts. Only 5.3 percent of all episodes included one or more hospitalizations, and 7 percent included one or more emergency room contacts. The mean number of medical office contacts per episode was 2.0. In 62.7 percent of all episodes, there was an initial or a follow-up office visit made for hemorrhoids as the primary complaint; in other episodes, hemorrhoids was a secondary finding at an office examination for another condition. Physical examinations were done during hemorrhoid episodes of care for 32.9 percent of the patients; in one-half of these cases, the physical examinations were the only contacts in the episode.

11. The office procedures used for 10 percent or more of hemorrhoid episodes were diagnostic proctosigmoidoscopy and

rubber band ligation of external hemorrhoids. Neither ligation, surgery, nor endoscopy were given to 67.3 percent of the patients. Ligation or surgery was performed one or more times in 19.8 percent of the episodes. Very few patients had any laboratory studies for hemorrhoids noted in the chart. Barium enemas were given to 10.9 percent of hemorrhoid patients. One or more drug orders were given to 50.7 percent of the patients whose episodes began in 1972 or 1973; 31.4 percent of the patients received local anesthetics, and 19.3 percent received laxatives. Orders for laxatives and local anesthetics, internal or external hemorrhoid surgery, and barium enemas were at least as likely to be noted at the index contact as later in the episode; other services were more likely to occur in later contacts.

12. The mean total outpatient dollar cost per episode, exclusive of drug costs, was $25.96; costs ranged from $0 to $445. In 32.4 percent of the episodes, no dollar costs were assigned to hemorrhoids. Of the total costs, an average of 36.1 percent was for office visits, 52.5 percent was for surgery, endoscopy, and other procedures, 8.9 percent was for radiology. Laboratory, telephone, and letter costs were a very small proportion of mean total cost.

V. BIVARIATE ANALYSIS

This section examines how resource use, measured by dollar cost per episode, varied as a function of selected patient, provider, medical care process, and utilization variables. Since 32.8 percent had no resource use assigned to

them, this analysis examined two issues. First, what characteristics determined whether any or no resources are used in treatment? Second, given the decision to treat hemorrhoids, what influenced the intensity of resource use?

A. Patient Characteristics

Males were more likely to have resource use during the episode than females (Table 8-25). However, given the decision to treat, both sexes received treatment of similar cost.

New and continuing episodes were equally likely to receive treatment (Table 8-26). Given the decision to treat, continuing episodes had a statistically significant higher cost than new episodes.

By definition, all episodes in which hemorrhoids was the presenting morbidity in at least one contact (whether at the index contact or later in the episode) had resource use. Of all episodes with hemorrhoids as an associated morbidity at the index contact, 31.3 percent had resource use, and 6.1 percent of episodes in which hemorrhoids was never the presenting morbidity had resource use (Tables 8-27 and 8-28). Given the decision to treat hemorrhoids, the presenting or associated morbidity status of the disease (whether at the index contact or over the entire episode) did not affect the level of resource use.

Eighty-six percent of those with symptoms at the index contact had resource use in the episode (Table 8-29); 60 percent of those without symptoms had resource use. Given the decision to treat, the presence or absence of symptoms did not

affect the level of resource use. The same was true for symptoms counted over the whole episode.

All episodes with tentative or unknown diagnoses at the index contact had resource use (Table 8-30); 64.6 percent of episodes with established index contact diagnoses had resource use.

At the index contact, a patient may have been immediately diagnosed as having hemorrhoids, or may have had an initial diagnosis of a symptom code or some condition other than hemorrhoids. Patients whose initial diagnosis was not hemorrhoids were more likely to have resource use than those who were intially found to have hemorrhoids (Table 8-31). Given the decision to treat, the nature of the initial diagnosis did not significantly affect the level of resource use.

Resources were less likely to be charged to hemorrhoids given the presence of anal-rectal disease or pregnancy (Table 8-32). Once the decision was made to treat hemorrhoids, the presence or absence of pregnancy or analrectal disease did not affect the intensity of resource use.

The year of the index contact did not affect the presence or absence of resource use in an episode of hemorrhoids (Table 8-33). For episodes with resource use, those beginning in the 1960s had a higher level of RVS use than did those beginning in 1970-1971; these in turn were more costly than those beginning in 1972-1973. This was due, in part, to truncation of episodes by the end of the study period; 40.7 percent of all episodes beginning in 1971 or before lasted at

least 30 days, while 16.4 percent of episodes beginning in 1972-1973 lasted at least 30 days. Also, it is possible that physicians shifted to less costly patterns of therapy during the 1970s.

The impact of episode duration on resource use is shown in Table 8-34. Approximately 45 percent of single-contact episodes had treatment assigned to them, 94.8 percent of episodes lasting two to 180 days had treatment; 84 percent of those lasting over 180 days were treated. Of episodes without resource use, 85 percent were single contact. Among episodes with resource use, single contact episodes cost the least, $13.40 per episode. Episodes lasting two to 14 days had a mean cost of $30.51. For episodes lasting over 30 days, the mean cost was $61.87.

Episode duration and year of index contact had separate effects on resource utilization. The two measures were related, but were not proxies for each other. The correlation coefficient of duration with year of index contact was $-.29$ ($p < .001$).

Patient age and subscriber unit size at the index contact did not affect either the presence or absence of resource use, or the level of resource use.

B. Provider Characteristics

Physician status at the index contact affected the presence or absence of resource use in the episode (Table 8-35).

Almost 94 percent of those whose episodes included a referral to a consultant had resource use in the episode, while

65.7 percent of those without a consultant (usually surgical) referral had any resource use (Table 8-36). For the 320 episodes with resource use, there was no difference in the level of resource use for those with and those without consultant visits.

Physician specialty at index contact was related to the presence or absence of resource use (Table 8-37). For episodes with resource use, there was no relationship between the level of resource use and the physician specialty at the index contact.

Ninety-two percent of those episodes which included one or more contacts with a surgeon had resource use; 44.1 percent of those who visited only internists had resource use; and 23.3 percent of those who visited an obstetrician without a surgeon contact had resource use (Table 8-38). For those with resource use, the mean dollar cost per episode was significantly different on the basis of physician specialty or combinations of specialties seen during the episode. The number of surgeon contacts in the episode explained 63.9 percent of the variation in resource use in the treated episodes.

C. Medical Care Process Characteristics

Resource use was more common in episodes with one or more contacts out of regular office hours, but mean cost of episodes is not affected by the presence of out of hours contacts (Table 8-39).

The likelihood of resource use was related to the type of appointment of index contact (Table 8-40). For those with

resource use, the mean dollar cost was also related to the type of appointment, regularly scheduled contacts being the most costly.

The presence of resource use versus no resource use was related to proportion of contacts which were regularly scheduled office visits (Table 8-41). Among episodes with resource use the mean dollar cost was also related to the proportion of regularly scheduled office visits.

There is a significant association between the presence or absence of resource use and whether a return visit is ordered and, if ordered, if the patient returns (Table 8-42). Among those with resource use, the most costly episodes were those in which the patient complied with instructions to return for further care; episodes in which no return was ordered were half as costly; episodes in which the patient failed to comply with instructions to return were least costly. This explained 10.3 percent of the variation in total cost of care of episodes with resource use.

Patient eligiblity for Health Plan coverage did not affect resource use.

D. Selected Utilization Measures

Resource use versus no resource use and total dollar cost were related to the proportion of contacts which were physical examinations (Table 8-43).

The presence of a walk-in medical office contact or a visit to the emergency room significantly increased the

likelihood of receiving resource use in a hemorrhoid episode (Table 8-44). However, for those with resource use, utilization was significantly higher without emergency room or walk-in contacts than it was for those with such contacts.

Table 8-45 shows that 48.2 percent of single medical office contact episodes had resource use; all episodes with five or more medical office contacts had resource use; 86 percent of episodes with two to four medical office contacts had resource use. For episodes with resource use, utilization cost was directly related to the number of medical office contacts.

Mean cost per episode was significantly related to office procedures and combinations of procedures (Table 8-46). The costliest episodes were those with rubber band ligation, or with combinations of procedures. Episodes with only internal or external hemorrhoid surgery had a mean cost of $43.80 per episode, while episodes with endoscopy alone had a mean cost of $37.90. Episodes with none of these procedures had a mean cost of $12.50.

The presence or absence of drug therapy was associated with resource use (nondrug, outpatient dollar costs) (Table 8-47). Only 43.5 percent of episodes without drug orders had resource use; 69.2 percent of those given laxative orders had resource use; and 72.4 percent of those given local anesthetic orders had resource use. All who received miscellaneous drug orders, and all who received drug orders in

two or more different therapeutic classes, had resource use assigned to the hemorrhoid episode. Of the patients with no dollar use assigned to their hemorrhoid episode, 7.7 percent received drug orders. Episodes with local anesthetic orders only were least expensive; episodes with laxative orders were most costly, but these differences are not significant.

Table 8-48 shows the association between dollar cost per episode with resource use, and the intensity of diagnostic and therapeutic procedures for hemorrhoids. The two measures of the number of contacts which explained the highest proportion of total variation in cost were the number of follow-up office visits per episode ($ETA^2 = .76$) and the total number of medical office contacts ($ETA^2 = .67$). The therapeutic procedure that explained the highest proportion of cost variation was the number of rubberband ligations per episode ($ETA^2 = .79$). The two diagnostic procedures most strongly associated with variation in cost were the total number of radiology procedures ($ETA^2 = .20$) and diagnostic proctosigmoidoscopies ($ETA^2 = .12$). The drug variable with the highest explanatory power was the total number of drugs ordered ($ETA^2 = .14$).

E. Summary of Bivariate Analysis

These patient, provider, and medical care process characteristics described higher cost episodes:

-- Male

-- Hemorrhoids noted as the presenting morbidity in one or more contacts in the episode

-- Symptoms noted in the medical record

-- Multiple contact episode

-- Consultant referral

-- One or more contacts with a surgeon, at the index contact or later in the episode

-- At least one regularly scheduled medical office visit in the episode, presumably for follow-up medical or surgical care

-- Patient compliance with index contact instruction by physician to return for further care

-- Drug therapy

-- Rubber band ligation of hemorrhoids, endoscopy, or internal or external hemorrhoid surgery were done

It appears that these episodes were ones in which hemorrhoids were symptomatic enough to cause the patient--often male--to return for follow-up care on his own initiative or on physician instructions; a surgeon referral was made; surgery, endoscopy, or ligation were performed.

The following characteristics were associated with lower episode resource use:

-- Female

-- Hemorrhoids was an associated morbidity at all contacts within the episode

-- No symptoms were noted in the medical record

-- Single contact episode

-- No regularly scheduled medical office visits

-- No consultant referral

-- No contact with a surgeon in the episode

-- Patient was not instructed at the index contact to return for further care, or the patient failed to comply with such instructions

-- Episode was composed entirely of physical examination(s)

-- No drug therapy, endoscopy, surgery, or litigation

Conversely, low cost episodes were those in which hemorrhoids were a secondary, asymptomatic finding, often among women, and perhaps at a physical examination. No surgical referrals, endoscopies or ligations were done, and no drug therapy was given.

Of the 239 patients who visited a surgeon at any point in the episode, 179, or 74.9 percent, visited a surgeon at the index contact. And 37.4 percent of those who visited a surgeon at the index contact received surgery or ligation, while only 9.1 percent of those who did not visit a surgeon at the index contact received surgery or ligation in the episode. The sorting of patients into those who did or did not visit a surgeon at the index contact may have been done by patient self-referral, referral by a non-surgeon at a prior contact not included in the data analyzed in this report, or by other providers during the initial contact.

Once the decision to treat a patient's hemorrhoids was made, patient sex, eligibility for Health Plan coverage, symptoms, comorbidities, presenting or associated morbidity status, and age did not affect treatment intensity.

VI. MULTIVARIATE ANALYSIS

A. Automatic Interaction Detection (AID)

This technique, described earlier was used to identify the combinations of specific components of utilization (office visits, laboratory and radiology procedures, hospitalizations, telephone calls, etc.) which best accounted for variation in dollar cost for the episode. This procedure was also used to define the combinations of patient, provider, and medical care process characteristics which best accounted for variation in resource use.

1. Utilization Measures

The dependent variable was total outpatient cost per episode, excluding drugs. Predictor variables are shown in Table 8-49; results are shown in Figure 8-2. The presence or absence of two or more rubber band ligations accounted for 47.7 percent of the cost variation. An additional 17.8 percent of cost variation was accounted for by the presence of combinations of initial office visits, follow-up office visits, internal or external hemorrhoid surgery, and barium enemas. Seven bundles of care were defined. The lowest mean cost bundle, $3.03 per episode, included no or one follow-up office visits, and no initial office visits charged to hemorrhoids at the presenting morbidity. No person who received the least costly bundle received internal or external hemorrhoid surgery. The costliest bundle, mean cost of $154.64 per episode, included those who received two or more rubber band ligations.

Table 8-50 shows that higher cost bundles represent a qualitatively different approach to care than to lower cost bundles. The number of initial and follow-up office visits increased with bundle cost. Most hemorrhoid surgery or ligations occurred in the two costliest bundles of care. The number of endoscopies increased with bundle cost, although fewer endoscopies were given in episodes with internal or external hemorrhoid surgery. The number of radiology procedures increased with bundle cost; the largest number of radiology procedures given per patient was in bundle 5, which was defined by the presence of one or more barium enemas. In the lowest-cost bundle, few diagnostic or therapeutic procedures were done; bundles 2 through 5 included increasing numbers of office visits, radiology procedures, and endoscopies; the two costliest bundles included hemorrhoid surgery of all types, including ligation.

2. Patient, Provider, and Medical Care Process Variables

This analysis, using total dollars per episode as the dependent variable, examines how different combinations of patient, provider, and medical care process variables affected the intensity of resource use. Variables are shown in Table 8-51, and results are shown in Figure 8-3. The most important single variable, which accounted for 15.1 percent of total variation in cost, was whether or not there were any contacts at which hemorrhoids was the primary reason for the patient contact. Another 19.9 percent of total variation in

cost was accounted for by these variables: (1) presence or absence of a regularly scheduled medical office visit during the episode, (2) presence or absence of a contact with a surgeon during the episode, (3) presence or absence of an instruction at the index contact to return for further care, (4) patient age, and (5) presence or absence of a physical examination within the episode.

If it appears that the patient's hemorrhoids were severe or symptomatic enough to note them as the primary reason for the patient's contact with the system, then the physician made a series of interrelated decisions about future treatment: whether to order the patient to return for further care, and whether to refer the patient to a surgeon. If the patient complied with instructions to return, the episode included at least one regularly scheduled medical office contact. Of the 35 percent of variation in cost explained by patient, provider, and medical care process variables, 89 percent was explained by variables which may reflect disease severity or physician choice in treatment plans.

Episode duration, which explained 21 percent of variation in cost, was not included in the AID analyses. Duration and year of index contact were inversely correlated, suggesting that part of the variation in episode duration was due to truncation of the episodes by the length of the study period.

B. Log-Linear Multiway Contingency Analysis

Log-Linear Multiway Contingency Analysis (LLMCA) is used to find the appropriateness of models by the likelihood ratio X^2 and by the X^2 goodness of fit.

Using the models (bundles) identified in the AID analyses, it is possible to identify the relative importance of two-factor and higher order interactions, and test the fit of each given model to the data. In this analysis, the seven bundles of care identified in the AID analysis were consolidated into five bundles of care for LLMCA; these five bundles, which explained 63.5 percent of variation in cost and the predictor patient/provider/medical care process variables, are listed in Table 8-52. The bundles of care were treated as a single variable with five possible values; the five patient, provider, and medical care process variables were used in an effort to determine which were associated with one or more of the five bundles of care.

Table 8-53 shows the statistically significant two-way relationships between the predictor variables and the bundle of care chosen. Episodes in which hemorrhoids was never the presenting morbidity received the lowest cost bundle of care more often than episodes with hemorrhoids noted at least once as the presenting morbidity. Episodes receiving the lowest-cost bundle were more likely to consist of a regularly scheduled medical office contact, without a surgeon visit or a physician instruction at the index contact to return for further care. Episodes with an initial office visit charged to hemorrhoids were more likely not to have a physical examination.

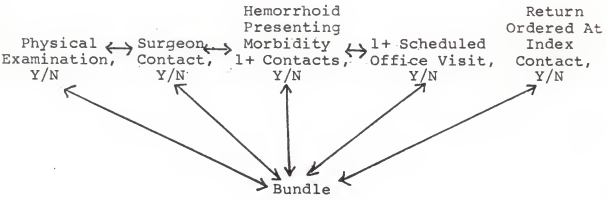
The table (8-53) also shows statistically significant two-way interactions among the predictor variables. Patients with episodes in which hemorrhoids was the presenting morbidity in at least one contact were more likely to have one or

more regularly scheduled medical office contacts, and more likely to have a surgeon contact, than were those without hemorrhoids noted as the presenting morbidity in any contact. Those with a surgeon contact were less likely to have a physical examination than those without a surgeon contact.

Table 8-54 shows statistically significant three-way interactions among the bundle of care and the predictor variables. Among patients receiving the least cost bundle of care, those without a physical examination in the episode were more likely to have episodes consisting solely of walk-in visits, emergency room or inpatient contacts, or telephone calls or letters. Patients with a physical exam were more likely than not to have one or more regularly scheduled medical office contacts. Among patients for whom hemorrhoids was never the presenting morbidity, those who did not have any regularly scheduled medical office contacts were more likely to visit a surgeon than those with scheduled contacts. Among patients for whom hemorrhoids was the principal reason for the contact at least once in the episode, those who had at least one regularly scheduled medical office contact were more likely to visit a surgeon than those who did not.

Diagrammed below is the pattern of two-way interrelationships between all examined variables which defined the choice of treatment bundle. Only interactions significant at the

$p \leq .05$ level were included. This model is adjusted for all three-way interactions.



The model shows that the presence or absence of a physical examination, or a surgeon contact, or a regularly scheduled medical office visit, or an index contact instruction by the physician to return for further care, and notation of hemorrhoids as a presenting or as an associated morbidity all had separate, direct influence upon the bundle of care chosen. Whether a return visit is ordered is independent of all other variables related to bundle choice. Also, the presence of one or more scheduled office visits is related, predictably, to whether or not hemorrhoids was a presenting morbidity, but, like the return order, is not independently related to surgeon contact or physical examination. This suggests that severity of disease does not account for all the variation in cost explaned by these variables.

VII. SUMMARY AND CONCLUSION

A. Episode Definition

Each patient's hemorrhoid episode included all Health Plan contacts at which hemorrhoids was a presenting or

associated morbidity. The episode began with the patient's first such Health Plan contact, and ended with the last hemorrhoid contact noted in the study period. This definition treated hemorrhoids as a chronic disease; recurrences were not examined separately.

This episode definition did not allow the complete elimination of disease severity as an explanation for the observed bundles of care. However, the log-linear analysis suggests that some of the variation accounted for by these variables is due to factors other than severity of the individual case. The episodes included those in which hemorrhoids was the presenting morbidity at least once, and those in which hemorrhoids was always an associated morbidity. The data did not allow clear separation of patients with internal or external hemorrhoids, or of those with single or multiple hemorrhoids.

B. Bundles of Care

Outpatient dollar cost, exclusive of drug costs, was the resource use measure for this disease. Seven bundles of care were defined; the variation among them explained 65.5 percent of total across episode cost variation. The cost of bundles of care varied with the number of rubber band ligations, hemorrhoid operations, barium enemas, and initial or follow-up office visits.

Three qualitatively different patterns of care appeared. The lowest cost pattern, usually given if hemorrhoids was never the presenting morbidity at any episode contact, included a single contact at which surgery, endoscopy, radiology, and ligation were not done. The medium cost bundles

usually did not include surgery, but did include differing numbers of radiology procedures, endoscopies, and office visits. The two high cost bundles were defined by the presence of two or more ligations, or of any internal or external hemorrhoid surgery. The bundles thus distinguished three diagnostic/treatment options: no care, nonsurgical care, and surgical care.

C. Influence of Patient, Provider, and Medical Care Process Characteristics

The specialty of the physician visited at the index contact appeared to determine the intensity of care given. Of those who initially visited a surgeon, 37.4 percent ultimately received surgery or ligation; 9.1 percent who initially visited other physicians received surgery. Since contact with a surgeon is not independently related to return orders and multiple office visits, severity alone probably does not explain all of the differences of episode cost which do and do not involve a surgeon. The data do not indicate the criteria which determined whether or not a patient saw a surgeon.

Once the decision to treat hemorrhoids was made, patient age, sex, comorbidities, Health Plan eligibility, major medical care process measures, and the presenting or associated morbidity status of hemorrhoids did not affect therapy.

TABLE 8-1†

Frequency of Comorbidities Among Hemorrhoid Episodes[1]

	Index Contact		Entire Episode	
	N	Percent	N	Percent
Anal-rectal disease	24	5.1%	36	7.6%
(One or more contacts with any of these comorbidities: 574.0 - Anal fissure and fistula 575.0 - Abscess of anal, rectal regions 578.6 - Proctitis 578.7 - Prolapse of rectum 578.9 - Other rectal and anal diseases)				
Pregnancy	13	2.7%	14	3.0%
(One or more contacts with any of these comorbidities: 640.0-689.0 - Delivery and abortion; complications of pregnancy, delivery, abortion, and puerperium 591.3 - Edema of pregnancy Y06.0 - Prenatal care visit Y07.0 - Postnatal care visit Y20.0-Y39.9 - Delivery and complications)				
Neither comorbidity	437	92.2%	424	89.5%
	474	100.0%	474	100.0%

[1]Morbidity codes are adapted from the 7th edition of the ICDA.

†Some tables sum to 99.9% or 100.1%; this is due to a rounding error.

TABLE 8-2

Presenting Morbidity at Index Contact for Hemorrhoid Episodes

	N	Percent
Hemorrhoids	450	94.9%
Other Morbidity	24	5.1
	474	100.0%

TABLE 8-3

Frequency of Symptoms in Hemorrhoid Episodes

	N	Percent
Symptoms of external hemorrhoids only	52	11.0%
(One or more contacts with any of these coded as symptoms or as comorbidities: T481 - anal-rectal pain T484 - anal swelling or mass T485 - anal itching 7080 - pruritus ani.)		
Symptoms of internal hemorrhoids	32	6.8
(One or more contacts in episode with T493, blood in stool, as a symptom or as a comorbidity.)		
Symptoms of internal and external hemorrhoids	2	0.4
No hemorrhoid symptoms coded	388	81.9
	474	100.0%

TABLE 8-4

Index Contact Symptoms in Hemorrhoid Episodes

	N	Percent
Internal hemorrhoid symptoms	30	6.2%
External hemorrhoid symptoms	34	7.2
Other symptoms[1]	65	13.7
No symptoms coded	345	72.8
	474	100.0%

[1] 53 of these patients were coded as having melena; most others had miscellaneous gastrointestinal symptoms

TABLE 8-5

Status of Diagnosis in Hemorrhoid Episodes

Index contact diagnosis status	N	Percent
Unknown	21	4.4%
Tentative	18	3.8
Established	435	91.8
	474	100.0%

Number of contacts in episode with diagnosis coded as 'unknown' or 'tentative'.	N	Percent
0	429	90.5%
1	33	7.0
2	9	1.9
3	3	0.6
	474	100.0%

Mean - 0.12 Range 0-3
S.E. - 0.02 Median 0.05

TABLE 8-6

Hemorrhoids as Presenting or Associated Morbidity

Morbidity status at index contact	N	Percent
Presenting morbidity	250	52.7%
1st-8th associated morbidity	224	47.3
	474	100.0%

Proportion of contacts in episode with hemorrhoids as presenting morbidity	N	Percent
0%	164	34.6%
1-50%	57	12.0
51-99%	46	9.7
100%	207	43.7
	465	100.0%

TABLE 8-7

Age Distribution for Hemorrhoids

	N	Percent
18-39	215	45.4%
40-59	169	35.7
60-83	90	19.0
	474	100.0%

Mean age - 43.8 yr.
SE - 0.7 yr.
Median - 42.5 yr.
Range - 18-83

TABLE 8-8

Episode Duration, First to Last Patient Contact with Health Plan for Hemorrhoids

Duration	N	Percent
Single day	239	50.4%
2-14 days	36	7.6
15-30 days	40	8.4
31-90 days	46	9.7
93-180 days	13	2.7
6-11.99 months	22	4.6
1-1.99 years	32	6.8
2-6.5 years	46	9.7
	474	100.0%

Mean duration - 194 days
S.E. - 20 days
Median - 1.5 days
Range - 1 day - 6.5 years

TABLE 8-9

Specialty of Physicians at Index Contact for Hemorrhoids

Specialty at index contact	N	Percent
Internal medicine	253	53.4%
Ob-gyn	31	6.5
Surgery	154	32.5
Emergency surgery	25	5.3
NHP (Physician assistant, etc.)	5	1.1
Urology	5	1.1
Other	1	0.2
	474	100.0%

TABLE 8-10

Number of Physician Contacts by Specialty for Hemorrhoid Episodes

	All Physician Contacts		Internist Contacts		Ob-Gyn Contacts		Surgery, Emergency Surgical Contacts		Other Specialty Contacts	
	N	%	N	%	N	%	N	%	N	%
0	2	0.4	193	40.7	440	92.8	235	49.6	451	95.1
1	234	49.4	190	40.1	31	6.5	104	21.9	19	4.0
2	101	21.3	56	11.8	2	0.4	47	9.9	4	0.8
3	47	9.9	22	4.6	1	0.2	33	7.0	--	--
4	33	7.0	7	1.5	--	--	18	3.8	--	--
5+	57	12.0	6	1.3	--	--	37	7.8	--	--
	474	100.0%	474	100.0%	474	100.0%	474	100.0%	474	100.0%
Mean	2.4		0.9		0.1		1.3		0.6	
S.E.	0.1		0.05		0.01		0.1		0.01	
Median	1.5		0.7		0.04		0.5		0.03	
Range	0-16		0-7		0-3		0-15		0-2	
% of all physician contacts for all episodes	100%		49%		6%		43%		2%	

TABLE 8-11

Physician Status at Index Contact of Hemorrhoid Episodes

Physician status at index contact	N	Percent
Regular attending	323	68.1%
Temporary attending	146	30.8
Consultant	5	1.1
	474	100.0%

TABLE 8-12

Types of Appointments for Hemorrhoid Episodes

Type of appointment at index contact	N	Percent
Regular scheduled medical office	269	56.8%
Walk-in medical office	145	30.6
Hospital emergency room	24	5.1
Hospital admission	8	1.7
Phone/letter	28	5.9
	474	100.0%

Types of contacts in episode

Number of contacts	Walk-in		Reg. scheduled	
	N	%	N	%
0	276	58.2	125	26.4
1	163	34.4	209	44.1
2	26	5.5	58	12.2
3	8	1.7	36	7.6
4	--	0	16	3.4
5+	1	0.2	30	6.3
	474	100.0%	474	100.0%
Mean	0.5		1.5	
S.E.	0.03		0.9	
Range	0-5		0-15	
Median	0.4		1.0	

Percent of total contacts in episode	Walk-in		Reg. scheduled	
	N	%	N	%
0%	276	58.2	125	26.4
1-99%	115	24.3	133	28.1
100%	83	17.5	216	45.6
	474	100.0%	474	100.0%

TABLE 8-13

Physician Instructions to Return for Further Care in Hemorrhoid Episodes

Index contact instructions	N	Percent
Return to same physician or to attending physician	110	23.2%
Return to consultant physician	42	8.9
Any return to physician ordered	151	31.9
Return to laboratory	16	3.4
Return to radiology	31	6.5
Any other type of return ordered*	9	1.9
Patient instructed to return for one or more of the above reasons	176	37.1

*Telephone call, hospital, pathology

TABLE 8-14

Patient Compliance with Index Contact Instructions to Return for Further Care for Hemorrhoids

	N	%
No return ordered at index contact	298	62.9
Return ordered at index contact, single contact episode	44	9.3
Return ordered at index contact, multiple contact episode	132	27.8
	474	100.0%

TABLE 8-15

Total Number of Contacts for Hemorrhoids

Number of contacts	N	%
1	235	49.6
2	102	21.5
3	47	9.9
4	32	6.8
5	16	3.4
6	16	3.4
7-10	22	4.6
12-16	4	0.8
	474	100.0%

Mean 2.4
S.E. 0.1
Median 1.5
Range 1-16

TABLE 8-16

Place of Service for Hemorrhoids

Place of service, index contact	N	Percent
Medical office	414	87.3%
Emergency room	24	5.1
Telephone, letter	28	5.9
Inpatient	8	1.7
	474	100.0%

Number of contacts in episode by place of service	Hospital		Medical Office		Emerg. Room		Telephone/ Letter		Any Other*	
	N	%	N	%	N	%	N	%	N	%
0	449	94.7	21	4.4	441	93.1	393	82.9	471	99.4
1	24	5.1	249	52.5	27	5.7	62	13.1	3	0.6
2	1	0.2	92	19.4	4	0.8	16	3.4	—	—
3	—	—	48	10.1	2	0.4	2	0.4	—	—
4	—	—	23	4.9	—	—	1	0.2	—	—
5+	—	—	41	8.6	—	—	—	—	—	—
	474	100.0%	474	100.0%	474	100.0%	474	100.0%	474	100.0%
Mean	.05		2.01		.09		.22		.006	
S.E.	.01		.09		.02		.03		.004	
Median	.02		1.4		.04		.10		.003	
Range	0-2		0-16		0-3		0-4		0-1	
Percent of total contacts, all episodes	1.7%		87.7%		4.0%		6.4%		0.1%	

*Includes outpatient surgery in operating room, or laboratory or radiology procedure without physician contact

TABLE 8-17

Medical Office Contacts for Hemorrhoids

Hemorrhoids as Presenting Morbidity

Number of contacts in episode	Initial Office Visit		Follow-up Office Visit		Physical Examination	
	N	%	N	%	N	%
0	244	51.5	306	64.6	318	67.1
1	222	46.8	75	15.8	136	28.7
2	7*	1.5	40	8.4	16	3.4
3	1*	0.2	26	5.5	3	0.6
4	--	--	9	1.9	1	0.2
5	--	--	5	1.1	--	--
6-7	--	--	7	1.4	--	--
8-10	--	--	4	0.8	--	--
11+	--	--	2	0.4	--	--
	474	100.0%	474	100.0%	474	100.0%
Mean	0.5		0.8		0.4	
S.E.	0.03		0.08		0.03	
Median	0.5		0.3		0.2	
Range	0-3		0-14		0-4	

*Multiple initial office visits in an episode were due to data system error.

TABLE 8-18

Office and Surgical Procedures for Hemorrhoids*

Name	Percent of Episodes With Given Number of Procedures				Mean Number Per Episode	S.E.	Range	Cost
	0	1	2	3+				
Drug-related telephone calls	93.0	6.1	0.8	--	0.08	0.01	0-2	$1.50
Diagnostic procto-sigmoidoscopy	84.8	13.9	1.3	--	0.16	0.02	0-2	$15
Diagnostic anoscopy	96.2	3.4	0.4	--	0.04	0.01	0-2	$5
Internal hemorrhoid treatment	97.9	1.9	0.2	--	0.02	0.01	0-2	Composite
External hemorrhoid surgery	93.2	6.3	0.4	--	0.07	0.01	0-2	$15
Complete hemorrhoidectomy	98.9	0.8	0.2	--	0.01	0.006	0-2	$100
Rubberband ligation	88.8	5.3	3.2	2.7	0.26	0.05	0-12	$30

*Procedure codes, 1964 RVS as adapted by Kaiser-Permanente
-Drug-related telephone calls: drug refill request, call to physician with prescription given after discussion of symptoms, other medication calls: 9082, 9086, 9091.
-Diagnostic proctosigmoidoscopy: 3310.
-Diagnostic anoscopy: 3411.
-Internal hemorrhoid treatment: includes 3318 - proctosigmoidoscopy with endoscopic control of hemorrhage; 3875, office excision of multiple hemorrhoids; 3412 - anal dilation without anesthesia.
-External hemorrhoid surgery: 3374 - removal of single external hemorrhoid; 3392 - incisional drainage of hemorrhoid.
-Complete hemorrhoidectomy: 3377 - complete external hemorrhoidectomy.
-Rubberband ligation of hemorrhoids: 3378.

TABLE 8-19

Combinations of Procedures in Hemorrhoid Episodes

Procedure Name	N	Percent
Endoscopy - anoscopy or sigmoidoscopy	61	12.9%
Internal or external hemorrhoid surgery	37	7.8
Rubberband ligation of hemorrhoids	31	6.5
Endoscopy, surgery	4	0.8
Endoscopy, rubberband ligation	17	3.6
Surgery, rubberband ligation	3	0.6
Surgery, ligation, and endoscopy	2	0.4
None of these	319	67.3
	474	100.0%

TABLE 8-20

Laboratory and Radiology Procedures for Hemorrhoids*

Test Name	% of Eps. with Given No. Tests				Mean No./Eps.	Range	Cost
	0	1	2	3+			
Any laboratory tests	94.7	1.9	1.3	2.1	0.14	0-8	Composite
Test of stool for blood	99.2	0.6	0	0.2	0.01	0-3	$0.60
Complete blood count	97.7	1.9	0.4	--	0.03	0-2	$3.60
Hemoglobin	99.6	0.4	--	--	0.004	0-1	$1.20
Hematocrit	98.9	1.1	--	--	0.01	0-1	$1.20
Any radiology test	88.6	8.9	2.5	--	0.14	0-2	Composite
Upper GI	98.5	1.3	0.2	--	0.02	0-2	$18
Barium Enema	89.0	10.5	0.4	--	0.11	0-2	$15-$24

*Procedure codes, 1964 CRVS as adapted by Kaiser-Permanente
-Test of stool for blood: 8801
-Complete blood count: 8628
-Hemoglobin: 8622
-Hematocrit only: 8681
-Upper GI tract: 7356
-Barium enema: 7360; barium enema with air contract: 7361

TABLE 8-21

Drug Orders for 140 Hemorrhoid Episodes Beginning in 1972 and 1973

Drug type	% of eps. with given no. drug orders				Mean/eps.	S.E.	Range
	0	1	2	3+			
Any drug order	49.3	32.1	11.4	7.1%	0.82	0.09	0-7
Analgesic	95.0	3.6	1.4	--	0.06	0.03	0-2
Laxatives	80.7	17.1	1.4	0.7	0.22	0.04	0-3
Local anesthetic	68.6	25.7	5.7	--	0.37	0.05	0-2
Steroids	94.3	5.0	0	0.7	0.07	0.03	0-3

Combinations of Drug Types Ordered in Hemorrhoid Episodes

	N	Percent
No drugs	69	49.3%
Laxative, only	13	9.3
Local anesthetic, only	29	20.7
Other drugs, only	8	5.7
Laxative and local anesthetic	5	3.6
Laxative and other drugs	6	4.3
Local anesthetic and other drugs	7	5.0
Laxative, local anesthetic, and other drugs	3	2.1
	140	100.0%

TABLE 8-22

Selected Measures of Utilization at the Index Contact for Hemorrhoids

Procedure	Number of episodes with procedure	Percent	Mean per-episode	S.E.	Mean in index contact as percent of episode mean†
Initial office visit	207	43.7%	.437	.023	87%
Follow-up office visit	16	3.4	.034	.008	4
Drug-related phone call	12	2.5	.025	.007	32
Endoscopy	30	6.3	.063	.011	30
Rubberband ligation	20	4.2	.042	.009	16
Any internal or external hemorrhoid surgery	26	5.5	.055	.010	51
Any laboratory tests	14	3.0	.030	.008	21
Barium enema	23	4.9	.049	.010	43
Laxatives ordered*	21	15.0	.150	.030	68
Local anesthetics ordered*	38	27.1	.271	.038	73
Any other drug ordered*	14	10.0	.100	.025	44
Any drug ordered*	58	41.4	.414	.042	50

†In an average episode for the period 1966-1973, the index contact was 43% of all episode contacts.

*Drug data have a base N of 140, since this data is available only for episodes beginning in 1972 and 1973. For episodes beginning in 1972-1973, the index contact was 59% of the mean total number of contacts.

TABLE 8-23

Costs of Outpatient Care for Hemorrhoid Episodes*

Dollars	Total Dollars		Lab.		X-ray		Office Visit		Office Procedures		Phone		Letter	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
0	154	32.4	449	94.7	420	88.6	177	37.3	318	67.1	410	86.5	461	97.3
0.1-5	33	7.0	15	3.2	--	--	32	6.8	10	2.1	64	13.5	12	2.5
5.1-10	86	18.1	6	1.2	--	--	135	28.5	2	0.4	--	--	--	--
10.1-15	28	5.9	2	0.4	33	7.0	52	11.0	66	13.9	--	--	1	0.2
15.1-20	16	3.4	1	0.2	1	0.2	38	8.0	5	1.0	--	--	--	--
20.1-25	24	5.1	--	--	8	1.7	17	3.6	6	1.3	--	--	--	--
25.1-30	18	3.8	--	--	5	1.1	3	0.6	21	4.4	--	--	--	--
30.1-40	22	4.6	--	--	6	1.2	12	2.5	1	0.2	--	--	--	--
40.1-50	22	4.6	--	--	1	0.2	5	1.0	9	1.9	--	--	--	--
50.1-60	16	3.4	1	0.2	--	--	1	0.2	12	2.5	--	--	--	--
60.1-75	21	4.4	--	--	--	--	1	0.2	3	0.6	--	--	--	--
75.1-150	23	4.9	--	--	--	--	1	0.2	15	3.2	--	--	--	--
150.1+	11	2.3	--	--	--	--	--	--	6	1.3	--	--	--	--
	474	100.0%	474	100.0%	474	100.0%	474	100.0%	474	100.0%	474	100.0%	474	100.0%
Mean	$25.96		$0.38		$2.31		$9.38		$13.57		$0.25		$0.08	
S.E.	$ 2.14		$0.13		$0.32		$0.49		$ 1.63		$0.03		$0.03	
Median	$10.00		$0.01		$0.96		$9.27		$ 0.00		$0.12		$0.01	
Range	$0-445		$0-51.60		$0-42		$0-80		$0-360		$0-4.50		$0-11	
Mean category dollar cost as percent of total mean dollar cost	100%		1.5%		8.9%		36.1%		52.3%		0.9%		0.3%	

*Excludes cost of drug therapy

TABLE 8-24

Index Contact Costs of Care for Hemorrhoids

Dollars	Lab, x-ray costs		Office visit, surgery costs		Total Costs	
	N	%	N	%	N	%
0	442	93.2	214	45.1	208	43.9
0.1-5	6	1.3	36	7.6	36	7.6
5.1-10	0	0	155	32.7	139	29.3
10.1-15	16	3.4	10	2.1	13	2.7
15.1-20	5	1.1	4	0.4	7	1.5
20.1-30	3	0.6	33	7.0	42	8.9
30.1-50	2	0.4	16	3.4	20	4.2
50.1+	0	0	6	1.3	9	1.9
	474	100.0%	474	100.0%	474	100.0%
Mean	$1.04		$7.97		$9.01	
S.E.	$0.21		$0.57		$0.62	
Range	$0-42		$0-110		$0-110	
Median	$0.02		$2.13		$4.97	
Index cost % tl. cost	39%		34%		35%	

TABLE 8-25

Resource Use in Hemorrhoid Episodes by Sex

Percent with Resource use	Male	Female	All
No	25.0%	39.9%	32.5%
Yes	75.0	60.1	67.5
	100.0%	100.0%	100.0%
	N=236	N=238	N=474

X^2=11.4, 1 d.f., p=.0008
cc=.16, gamma=-.33

If yes,

Mean Dollar Cost per Episode by Sex

	Mean	S.E.	N	F	SIG	ETA^2*
Male	$40.30	$4.20	177	0.47	.49	.0015
Female	$36.20	$4.00	143			

*Shows the proportion of all across-episode variation in resource use which was explainable by variation in this predictor variable alone.

TABLE 8-26

Resource Use, by New vs. Continuing Episodes of Hemorrhoids

Percent with Resource use	New	Continuing	All
No	32.4	34.5	32.5
Yes	67.6	65.5	67.5
	100.0%	100.0%	100.0%
	N=445	N=29	N=474

X^2=.001, d.f.=1, p=.97
cc=.01, g=-.05

If yes,

Mean Dollar Cost by New vs. Continuing Episodes

	Mean	S.E.	N	F	SIG	ETA^2
New	$35.90	$ 2.80	301	12.9	.004	0.039
Continuing	$79.60	$20.30	19			

TABLE 8-27

Resource Use by Presenting Morbidity vs. Associated Morbidity Status of Hemorrhoids at Index Contact

Percent with Resource use	Hemorrhoids as presenting morbidity	Hemorrhoids as an associated morbidity	All
No	0.0%	68.8%	32.5%
Yes	100.0	31.3	67.5
	100.0%	100.0%	100.0%
	N=250	N=224	N=474

If yes,

Mean Dollar Cost by Presenting vs. Associated Morbidity Status of Hemorrhoids at Index Contact

	Mean	S.E.	N	F	SIG	ETA^2
Presenting	$37.40	$3.00	250			
Associated	$42.30	$7.90	70	.5	.50	.0015

TABLE 8-28

Resource Use, by Proportion of Contacts in Episode in Which Hemorrhoids is the Presenting Morbidity

Percent with Resource use	No contacts in episode with hemorrhoids as presenting morbidity	1+ contacts in episode with hemorrhoids as presenting morbidity	All
No	93.9%	0.0%	32.5%
Yes	6.1	100.0	67.5
	100.0%	100.0%	100.0%
	N=164	N=310	N=474

If yes,

Mean Dollar Cost per Episode by the Number of Contacts in Which Hemorrhoids is the Presenting Morbidity

Number of contacts in which hemorrhoids are the presenting morbidity	Mean dollars	S.E.	N	F	SIG	ETA^2
None	$15.90	$5.80	10			
One or more	$39.20	$3.00	310	1.9	.17	.006

TABLE 8-29

Resource Use, by Presence or Absence of Hemorrhoid Symptoms at the Index Contact

Percent with Resource use	No symptoms	Symptoms of external hemorrhoids	Symptoms of internal hemorrhoids	Other symptoms	All
No	40.0%	11.8%	10.0%	13.8%	32.5%
Yes	60.0	88.2	90.0	86.2	67.5
	100.0%	100.0%	100.0%	100.0%	100.0%
	N=345	N=34	N=30	N=65	N=474

If yes,

Mean Dollar Cost per Episode by Index Contact Symptoms

Symptoms	Mean	S.E.	N	F	SIG	ETA^2
None	$37.30	$3.90	207			
External hemorr.	$34.40	$8.00	30	0.6	.63	.0054
Internal hemorr.	$34.80	$5.90	27			
Other symptoms	$46.50	$6.50	56			

TABLE 8-30

Resource Use for Hemorrhoid Episodes, by Status of Diagnosis at Index Contact

Percent with Resource use	Unknown diagnosis	Tentative diagnosis	Established diagnosis	All
No	0.0%	0.0%	35.4%	32.5%
Yes	100.0	100.0	64.6	67.5
	100.0%	100.0%	100.0%	100.0%
	N=21	N=18	N=435	N=474

If yes,

Mean Dollar Cost by Status of Diagnosis at Index Contact

	Mean	S.E.	N	F	SIG	ETA^2
Unknown	$32.70	$5.60	21			
Tentative	$25.60	$5.50	18	.740	.47	.0046
Established	$39.70	$3.30	281			

TABLE 8-31

Resource Use, by Presence or Absence of Hemorrhoids as the Initial Presenting Morbidity

Percent with Resource use	Hemorrhoids not as initial diagnosis	Hemorrhoids as initial diagnosis	All
No	4.2%	34.0%	32.5%
Yes	95.8	66.0	67.5
	100.0%	100.0%	100.0%
	N=24	N=450	N=474

X^2=7.9; 1 d.f.; p=.0048
cc=.14; gamma=-.84

If yes,

Mean Dollar Cost, by Presence or Absence of Hemorrhoids as the Initial Presenting Morbidity

	Mean	S.E.	N	F	SIG	ETA^2
Hemorrhoids not presenting morbidity	$35.30	$5.50	23	.09	.76	.0003
Hemorrhoids as presenting morbidity	$38.70	$2.20	297			

TABLE 8-32

Resource Use, by Presence or Absence of Comorbidities in the Episode of Hemorrhoids

Percent with Resource use	Anal-Rectal disease	Pregnancy	Neither rectal dis. nor preg.	All
No	36.1%	78.6%	30.7%	32.5%
Yes	63.9	21.4	69.3	67.5
	100.0%	100.0%	100.0%	100.0%
	N=36	N=14	N=424	N=474

X^2=14.4; 2 d.f.; p=.0007
cc=.17; gamma=.32

If yes,

Mean Cost in Dollars, by Comorbidity

	Mean	S.E.	N	F	SIG	ETA^2
Anal-rectal disease	34.9	6.8	23			
Pregnancy	23.7	22.1	3	.183	.83	.0012
Neither comorbidity	38.9	3.1	294			

TABLE 8-33

Resource Use for Hemorrhoids, by Year of Index Episode Contact

Percent with Resource Use	1966	1967	1968	1969	1970	1971	1972	1973	ALL
No	50%	29%	23.9%	34.0%	35.1%	30.3%	32.5%	41.3%	32.5%
Yes	50%	71%	76.1%	66.0%	64.9%	62.7%	67.5%	58.7%	67.5%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
	N=8	N=69	N=67	N=50	N=74	N=66	N=77	N=63	N=474

x^2=6.4, 7 d.f.; p=.49
cc=.11; gamma=-.09

If yes,

Mean Dollar Cost per Episode by Year of Index Contact*

	Mean	S.E.	N	F	SIG	ETA^2
1966 - 1969	$48.80	$5.90	137			
1970 - 1971	$36.30	$4.10	94	6.0	.0029	.0362
1972 - 1973	$24.80	$2.60	89			

*Grouping of years done empirically, on the basis of a breakdown of total dollar cost by ungrouped year of index contact.

TABLE 8-34

Resource Use for Hemorrhoids, by Episode Duration

Percent with Resource Use	Single Contact	2-14 days	15-30 days	31-90 days	91-180 days	181-364 days	1-1.99 years	2+ years	ALL
No	54.8%	2.8%	7.5%	4.3%	7.7%	18.2%	18.8%	13.0%	32.5%
Yes	45.2%	97.2%	92.5%	95.7%	92.3%	81.8%	81.2%	87.0%	67.5%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
	N=239	N=36	N=40	N=46	N=13	N=22	N=32	N=46	N=474

x^2=113.16; 7 d.f.; p<.0001
cc=.44; gamma =.69

If yes,

Mean Dollar Cost per Episode, by Duration

	Mean	S.E.	N	F	SIG	ETA^2
Single Contact	$13.40	$ .80	108			
2-14 days	$26.60	$ 3.40	35			
15-30 days	$34.20	$ 3.70	37			
31-90 days	$64.10	$ 8.10	44	11.695	<.0001	.2079
91-180 days	$66.10	$21.30	12			
181-364 days	$23.70	$ 7.80	18			
1 - 1.99 years	$64.50	$17.00	26			
2+ years	$73.70	$13.00	40			
(30+ days	$61.90	$ 5.90	140)			

TABLE 8-35

Resource Use for Hemorrhoids, by Status of Physician at Index Contact

Percent with Resource Use	Regular attending	Temporary attending	Consultant	All
No	42.7%	9.6%	40.0%	32.5%
Yes	57.3%	90.4%	60.0%	67.5%
	100.0%	100.0%	100.0%	100.0%
	N=323	N=146	N=5	N=474

χ=50.5, 2 d.f.; p<.0001
cc=.31; gamma = .71

If yes,

Mean Dollar Cost per Episode, by Physician Status at Index Contact

	Mean	S.E.	N	F	SIG	ETA^2
Regular attending	$44.50	$ 4.30	185			
Temporary attending	$30.50	$ 3.60	132	2.977	.0524	.0184
Consulting	$20.00	$15.00	3			

TABLE 8-36

Resource Use for Hemorrhoids, by Presence or Absence of a Consultant Contact in the Episode

Percent with Resource Use	No consultant	Consultant	All
No	34.3%	6.5%	32.5%
Yes	65.7%	93.5%	67.5%
	100.0%	100.0%	100.0%
	N=443	N=31	N=474

x^2=9.0; 1 d.f.; p=.0027
cc=.14; gamma =.76

If yes,

Mean Dollar Cost per Episode, by Presence or Absence of Consultant

	Mean	S.E.	N	F	SIG	ETA^2
No Consultant	$37.40	$ 3.00	291	1.19	.28	.0037
Consultant	$48.60	$11.20	29			

TABLE 8-37

Resource Use for Hemorrhoids, by Specialty of Physician Seen at Index Contact

Percent with Resource Use	Internist	Ob-Gyn	Surgeon	Other	All
No	43.9%	71.0%	10.1%	27.3%	32.5%
Yes	56.1%	29.0%	89.9%	72.7%	67.5%
	100.0%	100.0%	100.0%	100.0%	100.0%
	N=253	N=31	N=179	N=11	N=474

x^2=77.1; 3 d.f.; p<.0001
cc=.37; gamma=.55

If yes,

Mean Dollar Cost per Episode, by Physician Specialty at Index Contact

	Mean	S.E.	N	F	SIG	ETA^2
Internal Medicine	$35.30	$ 4.50	142			
Ob-Gynecology	$22.40	$11.70	9	.93	.42	.0088
Surgery	$42.70	$ 4.10	161			
All Other	$27.30	$ 9.60	8			

TABLE 8-38

Resource Use for Hemorrhoids, by Combinations of Physician Specialties Seen in Episode

Percent with Resource use	Internist only	Surgeon only	Internist and surgeon, only	Ob-Gyn, no surgeon	Ob-Gyn, with surgeon	Other, with surgeon	Other, no surgeon	All
No	55.3%	10.6%	4.3%	76.7%	0%	0%	37.5%	32.5%
Yes	44.7%	80.4%	95.7%	23.3%	100%	100%	62.5%	67.5%
	100.0%	100.0%	100.0%	100.0%	100%	100%	100.0%	100.0%
	N=197	N=151	N=69	N=30	N=4	N=15	N=8	N=474

If yes,

Mean Dollar Cost per Episode, by Physicians Seen During Entire Episode

	Mean	S.E.	N	F	SIG	ETA^2
Internist Only	$19.60	$ 1.70	88			
Surgeon Only	$39.70	$ 3.80	135			
Internist, Surg. Only	$61.70	$10.30	66			
Ob-gyn, No Surgery	$ 6.60	$ 2.00	7	6.113	<.0001	.1049
Ob-gyn, Surgery	$95.90	$45.20	4			
Other, Surgery	$44.70	$ 9.30	15			
Other, No Surgery	$10.30	$ 4.00	5			

Strength of Relationship of Number of Visits to Providers for Hemorrhoids, With Total Dollar Cost per Episode - 320 Episodes with nonzero Resource Use

Number of visits with:	F	SIG.	ETA^2
Internist	.256	.9699	.0057
Ob-Gyn	.191	.9024	.0018
Surgery	45.33	<.0001	.6392
Other providers	.304	.7379	.0019

TABLE 8-39

Resource Use for Hemorrhoids, by Presence of Episode Contacts Not in Regular Medical Office Hours

Percent with Resource Use	1+ Contacts out of Regular Hours	No contacts out of Regular Hours	All
No	6.4%	35.4%	32.5%
Yes	93.6%	64.6%	67.5%
	100.0%	100.0%	100.0%
	N=47	N=427	N=474

If yes,

Mean Dollar Cost by Presence of Out-of-Hours Contacts

	Mean	S.E.	N	F	SIG	ETA^2
No contacts outside hours	$38.60	$5.60	44	0	.98	0
$\geq$ 1 contact outside	$38.40	$3.30	276			

TABLE 8-40

Resource Use for Hemorrhoids, by Type of Appointment at Index Contact

Percent with Resource use	Regularly scheduled medical office visit	Walk-in medical office visit	Telephone, letter, inpatient	All
No	46.5%	14.2%	13.9%	32.5%
Yes	53.5%	85.8%	86.1%	67.5%
	100.0%	100.0%	100.0%	100.0%
	N=269	N=169	N=36	N=474

x^2=55.4, 2 d.f.; $p \leq .0001$
cc=.32; gamma =.64

If yes,

Mean Dollar Costs by Type of Appointment at Index Contacts

	Mean	S.E.	N	F	SIG	ETA^2
Regularly scheduled	$48.90	$5.40	144			
Emergency Room or office walk-in	$31.70	$3.30	145	5.8	.0033	.0354
Telephone, Letter, Inpatient	$21.70	$4.10	31			

TABLE 8-41

RESOURCE USE FOR HEMORRHOIDS, BY TYPE OF APPOINTMENT OVER THE EPISODE

Percent with Resource Use	No contacts in episode were regularly scheduled office visits	Some contacts in episode were regularly scheduled office visits	All contacts in episode were regularly scheduled office visits	All
No	22.4%	6.0%	54.6%	32.5%
Yes	77.6%	94.0%	45.4%	67.5%
	100.0%	100.0%	100.0%	100.0%
	N=125	N=133	N=216	N=474

x^2=96.6, 2 d.f.; p<.0001
cc=.41; gamma = -.59

If yes,

MEAN DOLLAR COST BY PROPORTION OF CONTACTS THAT ARE REGULARLY SCHEDULED

	Mean	S.E.	N	F	SIG	ETA^2
None Scheduled	$16.30	$1.30	97			
Some Scheduled	$48.60	$4.50	125	13.339	<.0001	.0776
All Scheduled	$47.50	$7.10	98			

TABLE 8-42

RESOURCE USE FOR HEMORRHOIDS, BY PRESENCE OR ABSENCE OF AN ORDER AT THE INDEX CONTACT TO RETURN FOR FURTHER CARE

Percent with Resource Use	Return not ordered at Index Contact	Return ordered at Index Contact; Pt. did not return	Return ordered at Index Contact; Pt. did return	All
No	44.0%	38.6%	4.5%	32.5%
Yes	56.0%	61.4%	95.5%	67.5%
	100.0%	100.0%	100.0%	100.0%
	N=298	N=44	N=132	N=474

x^2=65.6, 2 d.f.; p<.0001
cc=.35; gamma = -.69

if yes,

MEAN DOLLAR COST PER EPISODE, BY PRESENCE OF AN ORDER TO RETURN FOR FURTHER CARE AT THE INDEX CONTACT

	Mean	S.E.	N	F	SIG	ETA^2
No return ordered	$26.80	$3.50	167		<.0001	.1032
Return ordered, not done	$15.00	$1.90	27	18.2		
Return ordered, done	$59.00	$5.30	126			

TABLE 8-43

RESOURCE USE FOR HEMORRHOIDS, BY PRESENCE OR ABSENCE OF PHYSICAL EXAMINATIONS IN THE EPISODE

Percent with Resource Use	No physical examination contacts	Some contacts are physical examinations	All contacts are physical examinations	All
No	21.4%	12.3%	92.8%	32.5%
Yes	78.6%	87.7%	7.2%	67.5%
	100.0%	100.0%	100.0%	100.0%
	N=318	N=73	N=83	N=474

x^2=168.9, 2 d.f.; p<.0001
cc=.51; gamma = -.69

If yes,

MEAN DOLLAR COST PER EPISODE, BY PROPORTION OF CONTACTS THAT ARE PHYSICAL EXAMINATIONS

	Mean	S.E.	N	F	SIG	ETA^2
No physicals	$33.70	$2.60	250			
Some physicals	$59.20	$10.20	64	6.9	.0012	.0415
All physicals	$15.00	$3.90	6			

TABLE 8-44

RESOURCE USE FOR HEMORRHOIDS, BY PRESENCE OR ABSENCE OF EMERGENCY ROOM OR WALK-IN CONTACTS IN THE EPISODE

Percent with Resource Use	0 Emergency Room or Walk-in contacts	1+ Emergency Room or Walk-in contacts	All
No	48.8%	13.3%	32.5%
Yes	51.2%	86.7%	67.5%
	100.0%	100.0%	100.0%
	N=256	N=218	N=474

x^2=66.1, 1 d.f.; p<.0001
cc=.35; gamma = -.72

If yes,

MEAN DOLLAR COST, BY PRESENCE OR ABSENCE OF EMERGENCY ROOM OR WALK-IN CONTACTS

	Mean	S.E.	N	F	SIG	ETA^2
No E.R. or walk-in	$46.80	$5.70	131	5.7	.0178	.0175
E.R. or walk-in	$32.70	$3.00	189			

TABLE 8-45

RESOURCE USE FOR HEMORRHOIDS, BY THE NUMBER OF MEDICAL OFFICE CONTACTS IN THE EPISODE

Percent with Resource Use	0	1	2	3	4	5	6-16	All
No	23.8%	51.8%	16.3%	8.3%	4.3%	0	0	32.5%
Yes	76.2%	48.2%	83.7%	91.7%	95.7%	100%	100%	67.5%
	100.0%	100.0%	100.0%	100.0%	100.0%	100%	100%	100.0%
	N=21	N=249	N=92	N=48	N=23	N=12	N=29	N=474

If yes,

MEAN DOLLAR COST PER EPISODE, BY NUMBER OF MEDICAL OFFICE CONTACTS

	Mean	S.E.	N	F	SIG	ETA^2
0	$11.40	$2.40	16			
1	$14.50	$0.90	120			
2	$28.40	$2.50	77			
3	$48.90	$6.00	44	38.1	<.0001	.4220
4	$60.30	$10.00	22			
5	$76.50	$12.40	12			
6-16	$131.20	$19.90	29			

TABLE 8-46

RESOURCE USE FOR HEMORRHOIDS, BY THE COMBINATIONS OF OFFICE PROCEDURES USED IN THE EPISODE

Mean dollar cost per episode, by procedure mix used.*

	Mean	S.E.	N	F	SIG	ETA^2
Endoscopy	$37.90	$2.80	61			
Internal/external hemorrhoid surgery	$43.80	$6.30	37			
Rubberband ligation of hemorrhoids	$105.60	$17.10	31			
Endoscopy and surgery	$69.90	$26.00	4	43.8	<.0001	.4958
Endoscopy and ligation	$130.90	$15.40	17			
Surgery and ligation	$66.50	$2.50	3			
Endoscopy, surgery, and ligation	$164.50	$20.50	2			
None of these Procedures	$12.50	$0.80	165			

*N=320; only episodes with dollar costs charged had any of these procedures done.

TABLE 8-47

RESOURCE USE FOR HEMORRHOIDS, BY THE COMBINATIONS OF DRUGS USED IN THE EPISODE
140 EPISODES BEGINNING IN 1972-1973

Percent With Resource Use	No drugs	Laxative only	Local anesthetic only	Other drugs only	Laxative and local anesthetic	Laxative and other drugs	Local anesthetic and other drugs	Laxative, local anesthetic and other drugs	All
No	56.5%	30.8%	27.6%	0	0	0	0	0	36.4%
Yes	43.5%	69.2%	72.4%	100%	100%	100%	100%	100%	63.6%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
	N=69	N=13	N=29	N=8	N=5	N=6	N=7	N=3	N=140

If yes,

MEAN DOLLAR COST BY DRUG COMBINATION USED IN EPISODE

	Mean	S.E.	N	F	SIG	ETA^2
None	$23.60	$4.40	30			
Laxative only	$31.70	$5.80	9			
Local anesthetic only	$12.60	$3.00	21			
Other drug only	$34.70	$10.40	8	2.029	.0613	.1492
Laxative and local anesthetic	$32.60	$16.80	5			
Laxative and other drugs	$46.40	$19.00	6			
Local anesthetic and other drugs	$17.60	$2.20	7			
Laxative, local anesthetic, other drugs	$35.50	$14.80	3			

TABLE 8-48

ASSOCIATION BETWEEN MEAN DOLLAR COST PER HEMORRHOID EPISODE AND SELECTED UTILIZATION MEASURES, FOR 320 EPISODES WITH NONZERO DOLLAR COST

Utilization Measure	F	P Value	ETA^2
Physician Contacts	39.5	<.0001	.63
Medical Office contacts	53.1	<.0001	.67
Upper GI x-ray	12.7	<.0001	.07
Barium enema	34.2	<.0001	.17
Drug telephone calls	0.2	.82	.0012
Proctosigmoidoscopy	22.4	<.0001	.12
Anoscopy	0.1	.92	.0005
Internal hemorrhoid surgery	0.4	.68	.0024
External hemorrhoid surgery	0.02	.98	.0001
Complete hemorrhoidectomy	16.0	<.0001	.09
Rubberband ligation	120.7	<.0001	.79
Initial office visit	0.6	.61	.0057
Followup office visits	99.0	<.0001	.76
Test on stool for blood	0.1	.92	.0005
HCT, HGB, or CBC	10.1	.0016	.03
Hospitalizations	0.7	.51	.004
Emergency Room visits	0.7	.53	.007
Telephone/letter contacts	0.4	.78	.0056
Total number of drugs ordered*	2.7	.0243	.14
Number laxatives*	4.0	.0102	.12
Number local anesthetics*	4.5	.0132	.09
Number other drugs*	3.9	.01	.12
Total number laboratory tests in episode	2.8	.0077	.0592
Total number radiology procedures	40.9	<.0001	.2053

*N=85: resource-using episodes that began in 1972 or 1973.

TABLE 8-49

VARIABLES INCLUDED IN UTILIZATION AID ANALYSIS, FOR ALL 474 HEMORRHOID EPISODES

1. Hospitalizations (0,1-2)
2. Emergency room visits (0,1-3)
3. Telephone and letter contacts (0,1,2-4)
4. Medical office contacts, with hemorrhoids as presenting or associated morbidity (0,1,2,3,4,5,6,7-16)
5. Number of physical examinations with hemorrhoids as presenting or as associated morbidity (0,1,2-4)
6. Number of emergency room or walk-in contacts (0,1,2-5)
7. Barium enemas (0,1-2)
8. Number of laboratory tests in episode (0,1-8)
9. Drug-related telephone calls (0,1-2)
10. Number of diagnostic proctosigmoidoscopies (0,1-2)
11. Number of anoscopies (0,1-2)
12. Number of external hemorrhoid surgical procedures (0,1-2)
13. Number of complete hemorrhoidectomies or any other external hemorrhoid operations (0,1-2)
14. Number of rubberband ligations of hemorrhoids (0,1,2,3-12)
15. Any internal or external hemorrhoid surgery (exlcuding ligation) done in the episode (no, yes)
16. Number of initial office visits, with hemorrhoids as presenting morbidity (0,1-3)
17. Number of followup office visits, with hemorrhoids as the presenting morbidity (0,1,2,3,4,5-14)
18. Was the index contact an initial office visit with hemorrhoids as the presenting morbidity (no, yes)
19. Was the index contact a followup office visit with hemorrhoids as the presenting morbidity (no, yes)
20. Was anoscopy or proctosigmoidoscopy done at the index contact (no, yes)
21. Was rubberband ligation done at the index contact (no, yes)
22. Was internal or external hemorrhoid surgery (other than ligation) done at the index contact? (no,yes)
23. Was a barium enema done at the index contact? (no, yes)
24. Place of index contact (medical office, emergency room, letter, telephone, inpatient)

TABLE 8-50

COMPOSITION OF BUNDLES OF CARE FOR HEMORRHOID EPISODES

Bundle	Bundle N	Mean Number Given During Entire Episode: All radiology procedures Mean	S.D.	Initial and follow-up office visits Mean	S.D.	Endoscopies[1] Mean	S.D.	Rubberband ligation Mean	S.D.	Internal or external hemorrhoid surgery Mean	S.D.
1. 0 initial office visit, 0-1 follow-up office visits	207	.05	.27	.14	.35	.09	.31	.005	.07	0	0
2. Initial office visit, 0 follow-up office visits	129	.05	.21	1.04	.19	.08	.27	.008	.09	.13	.34
3. 1 initial office visit, 1 follow-up office visit	39	.23	.54	2.00	0	.36	.58	.13	.34	.28	.56
4. 2+ follow-up office visits, 0 barium enema, 0 internal or external hemorrhoid surgery	32	0	0	3.44	1.56	.56	.84	.25	.44	0	0
5. 2+ follow-up office visits, 1 barium enema, 0 internal or external hemorrhoid surgery	20	1.20	.41	3.75	1.71	.80	.52	.30	.47	0	0
6. 2+ follow-up office visits, internal or external hemorrhoid surgery done	19	.21	.53	3.57	1.02	.26	.45	.21	.42	1.11	.31
7. 2+ rubberband ligations	28	.47	.64	5.18	3.45	.64	.83	3.53	2.44	.07	.38
	474										
ETA[2]			.36		.68		.20		.64		.42

1 includes diagnostic proctosigmoidoscopy and anoscopy.

TABLE 8-51

VARIABLES INCLUDED IN PATIENT/PROVIDER/MEDICAL CARE PROCESS AID ANALYSIS FOR ALL 474 HEMORRHOID EPISODES

1. Proportion of all contacts that are regularly scheduled medical office visits (0%, 1-100%)
2. Proportion of contacts that are walk-in office visits (0%, 1-100%)
3. Are any contacts outside of regular office hours? (yes, no)
4. Comorbidities over episode (anal-rectal disease, pregnancy, neither)
5. Hemorrhoid symptoms present over episode (internal hemorrhoid symptoms and external hemorrhoid symptoms; external hemorrhoid symptoms only; internal hemorrhoid symptoms only; no hemorrhoid symptoms)
6. Proportion of contacts in which hemorrhoids is the presenting morbidity (0%,1-99%, 100%)
7. Proportion of contacts which are phsycial examinations (0%, 1-100%)
8. Is an internist visited in the episode? (no, yes)
9. Is a surgeon visited in the episode? (no, yes)
10. Are there any contacts in the episode in which the diagnosis is either 'unknown' or 'tentative'? (no, yes)
11. Are any symptoms noted in the episode? (no, yes)
12. Physician status over episode (consultant seen, only reg. attend. M.D. seen, only temp. attend. M.D. seen; temp. attend. and reg. attend. M.D. seen, without consult.)
13. Sex (male, female)
14. Patient age at index contact (18-39, 40-59, 60+)
15. Is the patient eligible for Health Plan coverage during the entire year of the index contact? (no, yes)
16. Patient subscriber unit size at index contact (1,2,3,4,5-12)
17. Morbidity status at index conatct (presenting, 1st assoc. morbidity, 2nd associated morbidity, 3rd- 8th associated morbidity)
18. Physician status at index contact (regular attending, temporary attending, consultant)
19. Is this a new episode? (no, yes)
20. Is the index contact presenting diagnosis hemorrhoids? (no, yes)
21. Return order at index contact? (no, yes)
22. Symptoms at index conatct (no symptoms, symptoms of internal hemorrhoids only, symptoms of external hemorrhoids only, gastrointestinal symptoms--primarily melena)
23. Is the index contact outside regular medical office hours? (no, yes)
24. Type of index contact appointment (regularly scheduled medical office visit, walk-in, hospital emergency room, telephone or letter, inpatient)
25. Status of diagnosis at index contact (established, tentative, unknown)
26. Physician specialty at index contact (internist, surgeon, obstetrician/gynecologist, other specialties)
27. Index contact comorbidities (anal-rectal disease, pregnancy, neither)
28. Year of index contact (1966-1973)

TABLE 8-52

BUNDLES OF CARE FOR HEMORRHOIDS AS IDENTIFIED BY AID ANALYSIS AND USED IN LOG-LINEAR MODELING

	N	Mean Dollars	S.D.
1. 0-1 rubberband ligations, 0-1 followup office visits, 0 initial office visits	207	$ 3.03	$ 9.26
2. 0-1 rubberband ligations, 0-1 followup office visits; 1 initial office visit	168	$ 19.74	$15.08
3. 0-1 rubberband ligations, 2+ followup office visits; no internal or external hemorrhoid surgery	52	$ 49.42	$53.04
4. 0-1 rubberband ligations, 2+ followup office visits; internal or external hemorrhoid surgery	19	$ 76.21	$53.05
5. 2 or more rubberband ligations	28	$154.64	$91.29
Total	474	$ 25.93	$46.66

Patient/provider/medical care process variables included in log-linear analysis

1. Is there a contact in the episode with hemorrhoids noted as the presenting morbidity? (yes, no)
2. Is there a regularly scheduled medical office contact in the episode? (yes, no)
3. Is there a contact with a surgeon in the episode? (yes, no)
4. Is a return visit ordered at the index contact? (yes, no)
5. Is a physical examination done in the episode? (yes, no)
6. Patient age at index contact (18-39, 40-59, 60+)

TABLE 8-53

HEMORRHOID EPISODES:
LOG-LINEAR PARAMETERS DIVIDED BY THEIR STANDARD ERRORS (BETA VALUES)
FOR ALL TWO-WAY RELATIONSHIPS WITH $P \leq 0.05$

	Bundles of Care				
	1. 2+ rubberband ligation	2. Internal or external hemorrhoid surgery	3. 2+ followup office visits, no surgery	4. 0-1 followup office visits, initial office visit	5. 0-1 followup office visits 0 initial office visit
Hemorrhoids never presenting morbidity				-6.234*** (.505)	5.859***(1.826)
Hemorrhoids presenting morbidity in 1+ contacts				6.234***(1.979)	-5.859*** (.548)
No regularly scheduled medical office contact					-2.730** (.755)
1+ regularly scheduled medical office contact					2.730** (1.324)
No surgeon seen in episode					3.943***(1.499)
Surgeon seen in episode					-3.943*** (.667)
No return ordered at index contact					2.171* (1.250)
Return ordered at index contact					-2.171* (.800)
No physical examination				3.543***(1.474)	
1+ physical examination				-3.543*** (.678)	

	Hemorrhoids never presenting morbidity	1+ contact with hemorrhoids as presenting morbidity		No surgeon contact	1+ surgeon contact
No regularly scheduled medical office visit	2.368* (1.146)	-2.368* (.873)	No physical examination	-2.60** (.861)	2.60**(1.161)
1+ regularly scheduled medical office visit	-2.368* (.873)	2.368* (1.146)	1+ physical examinations	2.60**(1.161)	-2.60** (.861)
No surgeon contact	3.060**(1.192)	-3.060** (.839)			
Surgeon contact	-3.060** (.839)	3.060**(1.192)			

* - $p \leq .05$
** - $p \leq .01$
*** - $p \leq .001$

TABLE 8-54

HEMORRHOID EPISODES:
LOG-LINEAR PARAMETERS DIVIDED BY THEIR STANDARD ERRORS (BETA VALUES)
FOR ALL RELATIONSHIPS WITH P < 0.05—THREE-WAY INTERACTIONS

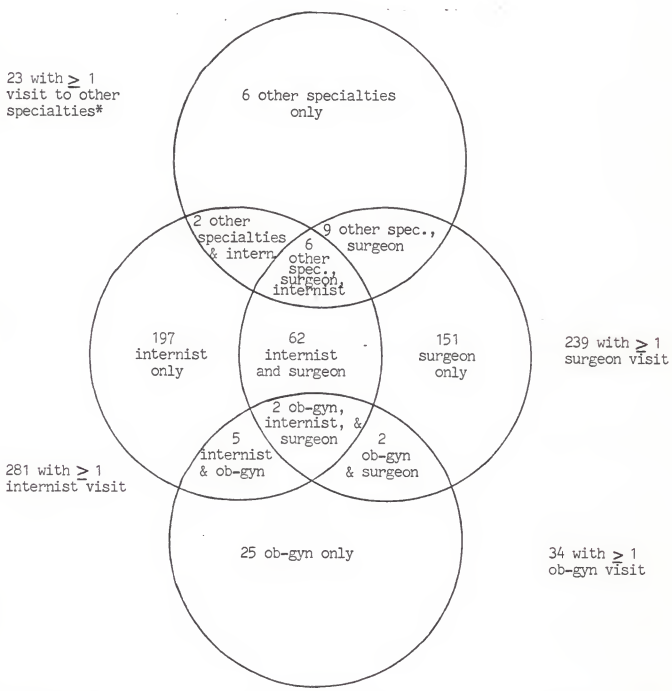
		Bundle 1 2+ rubberband ligation	Bundle 2 Surgery done	Bundle 3 2+ followup office visits, no surgery done	Bundle 4 0-1 followup office visits, 1 initial office visit	Bundle 5 0-1 followup office visits, 0 initial office visits
	No regularly					
No Physical Examination	scheduled contacts					2.020*(1.231)
	1+ regularly					
	scheduled contacts			No Statistically		-2.020* (.813)
	No regularly			Significant		
1+ Physical Examination	scheduled contacts			Associations		-2.020* (.813)
	1+ regularly					
	scheduled contacts					2.020*(1.231)

		Hemorrhoids never presenting morbidity	1+ contact with hemorrhoids as presenting morbidity
	No regularly		
No Surgeon	scheduled contacts	-2.321* (.875)	2.321* (1.143)
	1+ regularly		
	scheduled contacts	2.321*(1.143)	-2.321* (.875)
	No regularly		
	scheduled contacts	2.321*(1.143)	-2.321* (.875)
Surgeon			
	1+ regularly		
	scheduled contacts	-2.321* (.875)	2.321*(1.143)

* - $p < .05$
** - $p < .01$
*** - $p < .001$

FIGURE 8-1

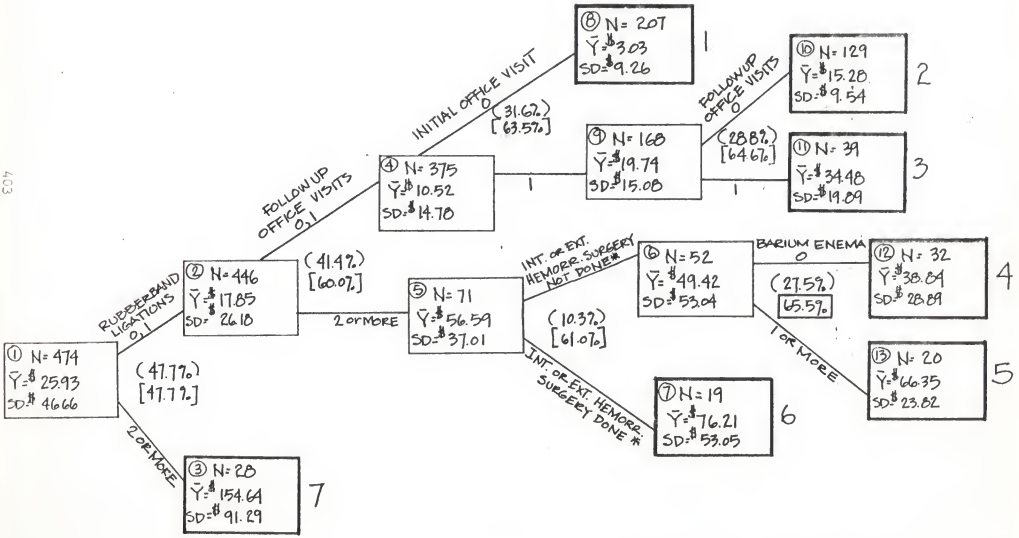
Specialty of Physicians Seen Over Entire Episode
(Hemorrhoids)



*This miscellaneous category of MD specialties includes one episode with an orthopedist visit; 10 with a urologist; one with an otolaryngologist; one with a mental health professional; six with a NHP; and five with other specialties. One patient saw physicians in two of these specialties.

FIGURE 1-2

A I D analysis tree for all 474 episodes of hemorrhoids; individual all-episode utilization measures are used to predict total episode dollar cost. Boxes contain number of cases (N), mean dollars per episode ($\bar{y}$), and standard deviation (S.D.) for episodes in each group. Parentheses contain percent of variation in parent group explained by each split. Brackets contain cumulative proportion of variation in cost for entire population explained by all prior splits. Large numbers indicate terminations of bundle pathways in order of increasing mean dollar costs.



*This is a separate set of procedures from rubberband ligation.

FIGURE 3

A I D analysis tree for all 474 hemorrhoid episodes; patient, medical care process, and provider characteristics are used to predict total episode dollar cost. For explanation of symbols, see Figure 2.

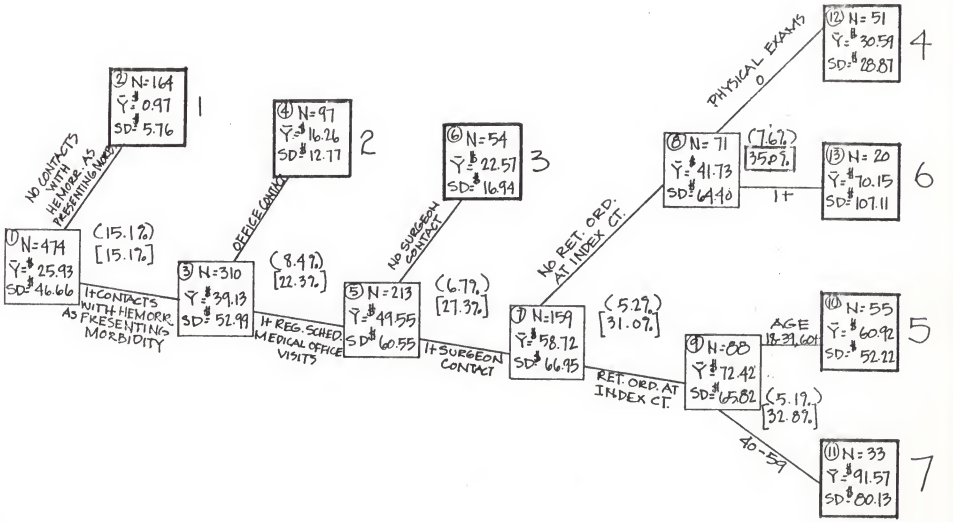


FIGURE 3.4

A I D analysis for all 465 hemorrhoid episodes; patient, medical care process, and provider characteristics are used to predict total RVS per episode year.

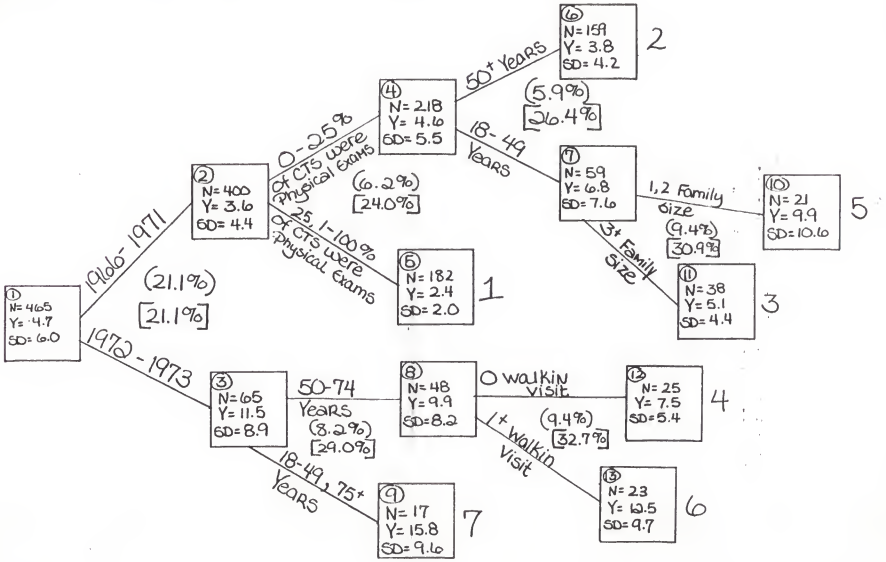
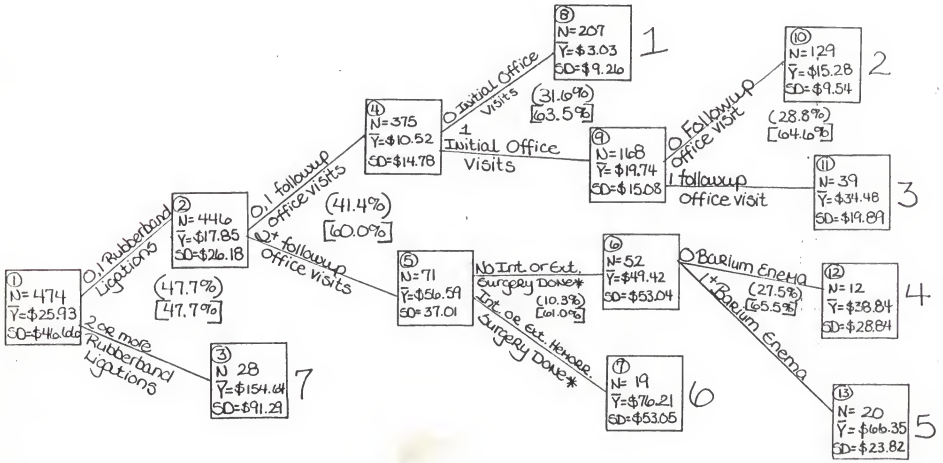


FIGURE 8

A I D analysis for all 474 episodes of hemorrhoids; individual all-episode utilization measures are used to predict total episode dollar cost. Boxes contain number of case (N), mean dollars per episode (Ȳ), and standard deviation (S.D.) for episodes in each group. Parentheses contain percent of variation in parent group explained by each split. Brackets contain cumulative proportion of variation in cost for entire population explained by all prior splits. Large numbers indicate terminations of bundle pathways in order of increasing mean dollar costs.



*This is a separate set of procedures from rubberband ligation.

FIGURE 8-5

A I D analysis for all 474 hemorrhoid episodes; individual all-episode utilization measures are used to predict total RVS. For explanation of symbols, see Figure 3-5.

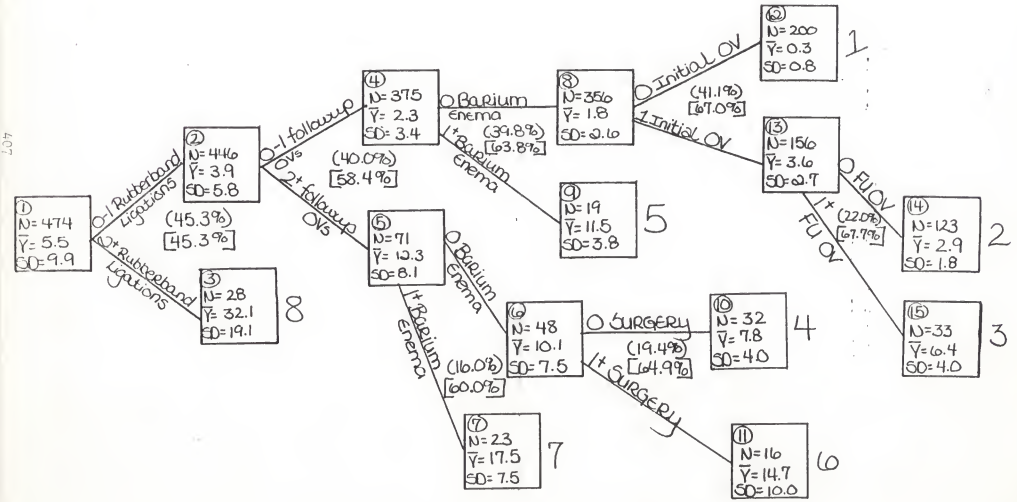


FIGURE 8-4

A I D analysis or all 474 hemorrhoid episodes; patient, medical care process, and provider characteristics are used to predict total episode dollar cost. For explanation of symbols, see Figure 3-5.

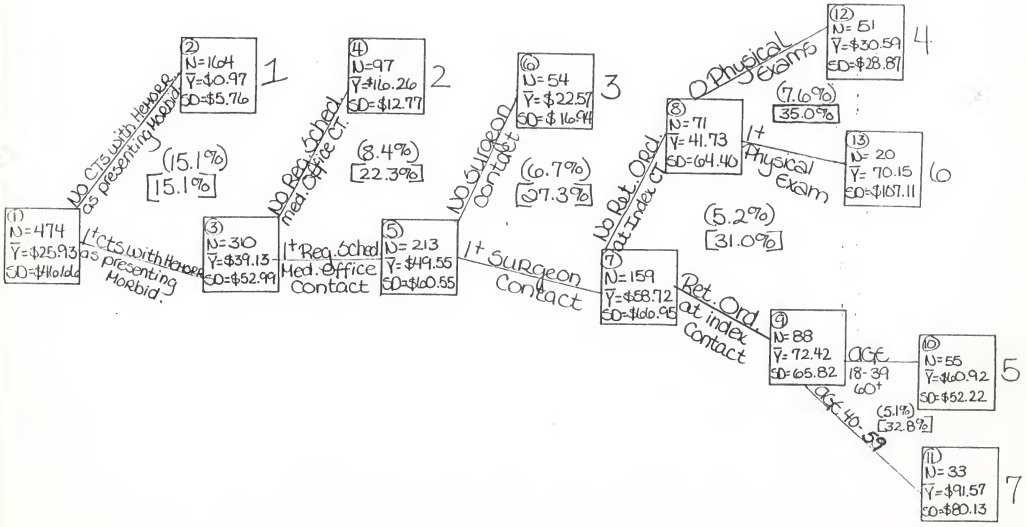
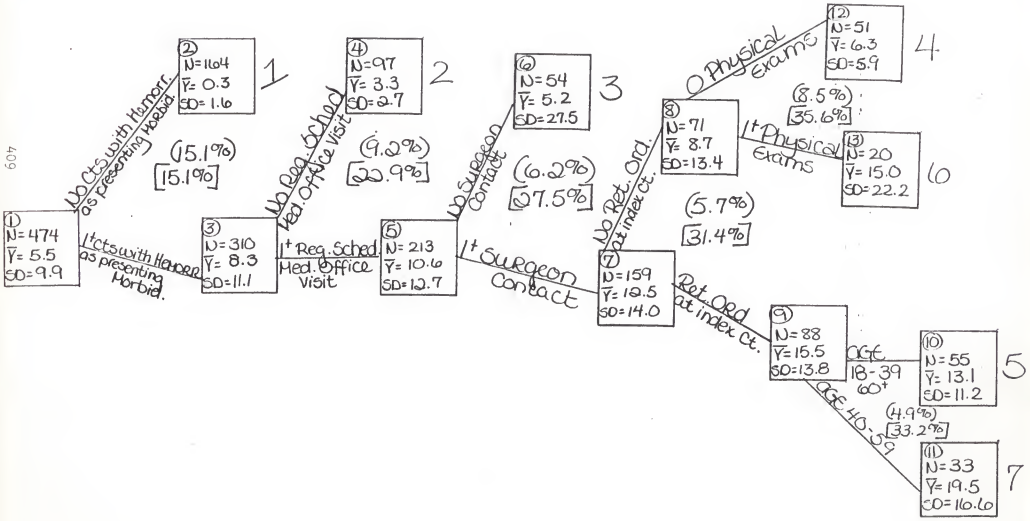


FIGURE 8-8

A I D analysis for all 474 hemorrhoid episodes; patient, medical care process, and provider characteristics are used to predict total episode RVS. For explanation of symbols, see Figure 3-5.



SECTION IX. OTITIS MEDIA

Richard E. Johnson and James Cech

ABSTRACT

An episode of otitis media consisted of all contacts for care during a 21-day period or less by a person 18 years of age or under. Only the first episode for each person was included. There were 1,565 episodes of otitis media identified in this manner.

The mean number of contacts per episode was 1.7, with about 90 percent of the episodes consisting of one or two contacts for care. The mean number of RVS units per episode was 2.2, with 11 RVS units being the highest number in any episode. Thirteen percent of the episodes had no RVS units charged to them. Office visits contributed most of the RVS units charged to otitis media.

Eight treatment bundles were derived for episodes of otitis media where there was resource use in the episode and where otitis media was a primary reason for a contact during the episode. These treatment bundles accounted for 67 percent of the variation in RVS units per episode. The number of contacts for care accounted for most of the variation in RVS units among episodes.

When drug orders were assigned an RVS value and includes in the analysis, seven treatment bundles were defined and the episodes in these bundles accounted for 67 percent of the variation in RVS units per episode. Drug orders for antibiotics were the second most important factor in accounting for the variation in RVS units among episodes.

Patient, provider, and medical care process characteristics were not significant influences in the number of RVS units per episode. The most important influence appeared to be the attending pediatrician.

The variation in resource use among episodes of otitis media was largely due to more frequent use of the same procedures. This suggested either differences in the severity of episodes or that, while recognized methods of treatment were observed, numerous episodes received too little and/or too much treatment.

Disease Identification

This report examines episodes of otitis media. Otitis media is an acute inflammation of the middle ear, usually of bacterial etiology, with recognized methods of diagnosis and treatment.

For purposes of this report, acute otitis media was defined according to the International Classification of Diseases, Adapted, 7th Revision as codes 391.0 (acute catarrhal otitis media) and three modifications of the code. These modifications are 391.2 (otitis media without antibiotic), 391.3 (suppurative purulent otitis media), and 391.9 (otitis media, unspecified, with antibiotic).

Patients with certain ICDA codes pertaining to otitis media were excluded from the sample. Patients with disease coded as chronic otitis media (391.1), defined as a case of otitis media with a duration of greater than 60 days were excluded. Recurrent otitis media (391.5), defined as three or more acute otitis media attacks within a two year, period was also excluded. Other diseases of the ear and mastoid process (393.0), and other deafness (398.0) were also excluded.

The exclusion of chronic and recurrent cases of otitis was an attempt to provide homogeneity to episodes of otitis media by removing those prone to develop either more severe or more frequent attacks of otitis media. Removal of patients with the other diseases of the ear is also an attempt to enhance the similarity of the disease process under study.

Lastly, since otitis media is primary a disease of children, only patients 18 years of age and under were included.

Episode Definition

An episode of acute otitis media began with a contact where otitis media (as defined) was the updated presenting morbidity. The end of the episode was arbitrarily defined as the date 21 days after the contact that initiated the episode. This approach permitted a sufficient period of time for treatment and follow-up examination of uncomplicated disease. While the analysis of episodes defined in this manner facilitates the identification of different approaches to the treatment of uncomplicated otitis media, it does not deal with the respective outcomes from the various approaches.

Defining episodes in this manner also made it possible for an individual to have multiple episodes of otitis media if the time between contacts for otitis media exceeded 21 days. Only the first episode of otitis media for an individual was selected. This is an attempt to minimize any bias that might be introduced into diagnosis and treatment from multiple episodes per individual.

The selection of episodes in this manner led to the identification of 1,565 episodes of acute otitis media among a random 5 percent sample of KPMCP members during the time period September 1966 through December 1973.

Table 9-1 shows the number of episodes by the ICDA codes. Most episodes were identified as unspecified otitis media with antibiotic treatment ordered.

Utilization and Resource Use

The 1,565 episodes of otitis media involved 2,607 contacts for care. Almost 90 percent of the episodes involved one or two contacts (Table 9-2). The mean number of contacts per episode was 1.7. The small standard error of the mean indicated there was little variation in the pattern.

Various services were provided. Those of interest include hospital admissions, office, laboratory and radiology procedures and drug orders.

None of the episodes of otitis media resulted in a hospital admission during the episode. Table 9-3 shows the number of different types of office procedures that involved resource use (had RVS units coded to them) during the episodes of otitis media. Approximately 87 percent of the episodes had one or more office procedures coded to the episode; most of these procedures were initial or follow-up office visits for otitis media. About 5 percent of episodes had resource use coded for telephone calls and only two episodes had resource use from letter contacts.

Laboratory tests were performed at the initial contact in only 23 episodes (1.5 percent), and 12 had more than one laboratory test performed at the initial contact. There were 2.2 percent of episodes with one or more laboratory procedures during the episode. Three was the most laboratory procedures for any episode. Only eight episodes (0.5 percent) had a radiology procedure. The small number of laboratory tests may

be attributed to two factors: a standard procedure of antibiotic treatment of affected individuals without tympanocentesis and culture of withdrawn fluid, and the likelihood that in cases where there was a respiratory or infectious comorbidity, the laboratory work for microbial identification was charged to that morbidity.

Parenteral drug treatment was provided for 53 percent of episodes at the time of the first contact. During the episodes, 56.6 percent received one or more orders for parenteral drug treatment. The total number of drugs ordered per episode of otitis media is shown in Table 9-4. Almost 92 percent of the episodes in 1972 and 1973 had one or more drug orders including both oral and parenteral drug treatment. Six was the largest number of oral drug orders for any episode with the mean number being 1.5 drug orders per episode.

Table 9-5 shows the conversion of the different procedures to RVS units. Almost all of total RVS units were the result of office visits with less than two percent of total RVS units the result of laboratory and radiology procedures. It should be noted however, that there were no RVS units assigned to drugs at this time.

Table 9-6 shows the distribution of resource use among the episodes of otitis media. About 13 percent of episodes had no resource use coded to them. The mean number of RVS units per episode was 2.2 with 11 being the largest number of RVS units coded to an episode.

Patient, Provider, and Medical Care Utilization

The description of episodes of otitis media by patient, provider, and medical care process characteristics was made for episodes with and without resource use. The episodes with no resource use (zero RVS units) were judged to be a group with a unique treatment bundle. However, it should be noted that since a high percentage of episodes of otitis media had drug orders, episodes classified as having no resource use (RVS units) may have had resource use if drug orders are considered. Among the 58 episodes in 1972 and 1973 that had no RVS units coded to them, 55.2 percent of them had one or more drug orders for an antibiotic. If the experience of these years is applicable to all years, it means than more than one-half of the 207 episodes with no resource use coded to them may have had some resource use in the form of antibiotic drug orders. Thus, the results from comparing episodes with and without resource use must be interpreted with caution.

Patient Characteristics

Table 9-7 shows the frequency of episodes by the selected ICDA codes. Otitis media, unspecified, with antibiotic ordered was the most frequent diagnosis, comprising somewhat more than 84 percent of the episodes. The proportion of otitis media episodes classified as unspecified with antibiotic was substantially greater among episodes with resource use (Group A) than among episodes with no resource use (Group B). Episodes with drug treatment ordered should be more severe episodes than episodes with no drug treatment ordered.

Almost one-half of the episodes occurred in children two years of age or younger and almost 70 percent in children five years of age or less (Table 9-8). The presence or absence of resource use did not appear to be related to age. Approximately 53 percent of episodes of otitis media were among females, and the presence or absence of resource use was apparently not related to sex.

Forty percent of episodes of otitis media had no comorbidities during the episode (Table 9-9). However, episodes with resource use were substantially more likely to have no comorbidities during the episodes and to have fewer comorbidities during the episode. Forty-six percent of Group A episodes had no comorbidities during the episode while only 1.4 percent of Group B had no comorbidities during the episode. This same pattern for comorbidities also prevailed at the time of the first contact for otitis media. A potential explanation for these patterns is presented subsequently.

There were nearly 60 percent of episodes with symptoms reported at the time of the first contact for otitis media. Episodes with resource use were somewhat more likely to have a symptom reported than episodes with no resource use.

In those episodes in which symptoms were noted at the index contact, symptoms relating to the ear were most common, followed by fever. Fatigue, cough, and cold were other symptoms present in some episodes. Episodes with resource use were substantially more likely to report fever and ear-related symptoms than episodes with no resource use.

The duration of the major presenting symptom was recorded for 449 episodes with resource use. The duration ranged from less than 24 hours to 28 days. Among these episodes, symptom duration was less than 24 hours in about 13 percent of episodes and longer than three days in 19 percent of the episodes. The mean length of symptom duration was approximately three days.

About 98 percent of episodes were KPMCP eligible at the first contact and this percentage did not differ appreciably among Group A and Group B episodes. Ninety-eight percent of episodes had KPMCP eligibility for all contacts during the episode with little difference in this percentage between Group A and Group B episodes.

Provider Characteristics

Pediatricians were the physicians at first contact for 95 percent of episodes. ENT specialists were the next most frequent physicians at first contact. A somewhat larger percentage of episodes with resource use (96 percent) were attended by pediatricians at first contact than episodes without resource use (91 percent). Only 3.8 percent of all episodes had no contact with pediatricians during the episodes. All physician contacts during the episodes of otitis media were with KPMCP physicians.

Seventeen different pediatricians were represented at the first contact for 88 percent of the episodes with resource use. These 17 physicians were represented in more than 76 percent of all episodes of otitis media.

The attending physician was the regular physician at the time of the first contact for 45 percent of all episodes. In almost all of the remaining episodes, the physician at first contact was a temporary attending physician. The physician at the time of first contact was less likely to be the regular physician among episodes with resource use than among episodes without resource use.

Medical Care Process Characteristics

Approximately 76 percent of all episodes of otitis media began in the medical office. A slightly smaller proportion of episodes with resource use began there. During the course of all episodes almost 87 percent had one or more contacts in the medical office (Table 9-10). It appears that episodes with resource use were somewhat more likely to have contacts in the medical office and substantially more likely to have multiple contacts in the medical office during the episode.

Table 9-10 also shows that almost 22 percent of all episodes had one or more contacts in the emergency room and that episodes with resource use were also more likely to have this type of contact than episodes without resource use.

Approximately 80 percent of all episodes began during office hours. About 88 percent of all episodes of otitis media had contacts during medical office hours (Table 9-11). Episodes without resource use were somewhat more likely than episodes with resource use to have had no contact during office hours. About one-half of all episodes involved no regularly

scheduled contacts. Episodes without resource use were more likely to have no regularly scheduled contacts than episodes with resource use.

Sixty-five percent of all episodes had one or more walk-in contacts. Episodes with resource use were somewhat more likely to have walk-in contacts than episodes without resource use.

Otitis media was the presenting morbidity in 67.2 percent of all contacts in all episodes. All such episodes involved resource use and comprised 77.5 percent of episodes with resource use.

The diagnosis of otitis media was an established diagnosis at the time of the first contact for 94 percent of all episodes. This percentage was the same for Group A and Group B episodes.

A return visit was requested at the time of the first contact for 68.3 percent of all episodes. This request was more frequent for episodes with resource use than for episodes without resource use (74 vs. 47 percent). Eighty-four percent of Group A episodes and 75 percent of Group B episodes with such requests had return visits requested to the physician attending the first contact. The most common return patterns among both groups were 7, 10, or 14 days. Other types of return visits were infrequently requested among both groups.

The type of otitis media treated, the presence of fever and ear-related symptoms, and the frequency of return visits requested among episodes of otitis media with resource use

suggest that these episodes may be more severe than episodes with no resource use. This is not an unusual observation, as more intensive resource use should be associated with the more severe episodes. However, it was observed that episodes with resource use were less likely to have one or more concurrent morbidities with otitis media. It seems that episodes with comorbidities should be more complicated and be more likely to have resource use. The reason for this is the guidelines used to assign an office visit to a morbidity when multiple morbidities occur at a contact.

All episodes where otitis media was the presenting morbidity had resource use and, as would be expected, these episodes were more likely to have all types of contacts with the medical care system.

The preceding description of episodes of otitis media with resource use provide a rather typical presentation and treatment pattern. All episodes involve children, almost all of whom see a pediatrician at first contact. The diagnosis is established at the first contact in the medical office, whether a regularly scheduled or walk-in visit during office hours. An oral or parenteral antibiotic is ordered and the patient is requested to return, usually to the same physician, in seven to 14 days.

Bivariate Analysis

This analysis involved the 1,358 episodes of otitis media for which there was resource use coded to the episode. The purpose of this analysis was to show which, if any, patient, provider, and medical care process characteristics appear to

be significantly related to the extent of resource use in episodes of otitis media.

The absence of comorbidities in the episode appears to be associated with substantially greater resource use during the episodes (Table 9-12). The age at first contact and the presence of a symptom at first contact were also significantly related to greater mean RVS units per episode. Sex was not related to extent of resource use and while eligibility at first contact appeared to generate greater mean RVS units/episode, only 1.9 of episodes were with persons not KPMCP eligible at first contact.

Provider specialty and status at first contact for the episode were not related to extent of resource use during the episode (Table 9-13). However, individual pediatricians differed significantly in their resource use. Among individual pediatricians, mean RVS units per episode of otitis media ranged from 1.7 to 3.4.

Extent of resource use per episode was also related to type of appointment, year, status of diagnosis, and whether or not a return visit was requested at first contact (Table 9-14). Greater resource use was more likely with episodes that had appointments other than regularly scheduled ones; with episodes in earlier years; with episodes with unknown diagnoses at the initial contact; and with episodes having a return visit requested at the first contact.

This analysis suggests that a number of patient, provider, and medical care process characteristics do appear to

be significant factors in the extent of resource use for episodes of otitis media. The analysis, however, does not take into account any potential interaction effects among these characteristics.

The first set of analyses attempted to identify the utilization measures that accounted for the variation in resource use among episodes.

The episodes of otitis media included in these analyses are those: 1) with resource use, and 2) where otitis media was the primary reason for the contact. Previous data have shown that otitis media was always the primary reason for the contact for episodes with resource use. Drugs are a major treatment modality and represent a substantial resource cost in episodes of otitis media. For this disease only, drug orders were assigned RVS units* and total resource use per episode was examined with RVS units for drugs not included and with RVS units for drugs included.

Utilization Not Including Drugs

The dependent variable for this AID analysis (resource use) is the total number of RVS units per episode and does not include any RVS units for drug orders. The independent variables (utilization measures) used in this analysis are listed in Attachment B. These utilization measures accounted for 67 percent of the variation in resource use among episodes of

* The procedure by which the drug orders for otitis media were assigned RVS units is described in Attachment A.

otitis media (Figure 9-1). The number of contacts accounted for 57 percent of the total variation. The remaining 10 percent was accounted for by the number of parenteral drug therapies and by the number of telephone/letter contacts.

Eight treatment bundles can be identified which account for the variation. The treatment bundles, the number of episode, and the mean number of RVS units per episodes in the treatment bundle are:

1. One Contact, No Parenteral Drug Therapy
   $N=211$, $\bar{y}=2.0$

2. One Contact, One or More Parenteral Drug Therapies
   $N=282$, $\bar{y}=2.5$

3. Two Contacts, One or More Telephone/Letter Contacts
   $N=25$, $\bar{y}=2.4$

4. Two Contacts, No Telephone/Letter Contacts, No Parenteral Drug Therapy, $N=139$, $\bar{y}=3.1$

5. Two Contacts, No Telephone/Letter Contacts, One or More Parenteral Drug Therapies, $N=268$, $\bar{y}=3.6$

6. Three Contacts, One or More Telephone/Letter Contacts
   $N=33$, $\bar{y}=3.4$

7. Three Contacts, No Telephone/Letter Contacts
   $N=67$, $\bar{y}=4.6$

8. Four or More Contacts
   $N=29$, $\bar{y}=5.7$

Increased resource use in otitis media episodes appears to be associated with increased numbers of contacts, the presence of parenteral drug treatment, and the absence of telephone contacts.

Utilization Including Drugs

The episodes of otitis media included in this analysis are the 1972 and 1973 episodes with: 1) resource use, and

2) otitis media as the presenting morbidity at the first contact.

A comparison of the utilization measures for these 1972-1973 episodes with the episodes for all years shows few differences. The 1972-1973 episodes had a slightly smaller mean number of contacts per episode (1.6 vs. 1.7) and the 1972-1973 episodes had a somewhat larger percentage of episodes with parenteral drug treatment.

Two additional independent variables were included in this analysis. They were the number of orders for antibiotics (0, 1, 2 or more) during the episodes and the number of orders for antihistamines and decongestants (0, 1 or more) during the episode. Among these episodes, 91.3 percent had one or more drug orders for antibiotics with a mean of 1.2 such orders per episode. The maximum number of antibiotic drug orders during an episode was six. There were 22.8 percent of the 1972-1973 episodes that had one or more orders for antihistamines and decongestants. The maximum number in an episode was three.

The dependent variable for this analysis (resource use) was the total number of RVS units per episode including the RVS units assigned to drug orders. When the RVS assigned to drugs was added to each episode, the mean number of RVS units per episode increased from 3.0 to 3.6 units per episode. The RVS units assigned to drugs accounted for 20 percent of the total RVS units for the 1972-1973 episodes.

The results of this analysis are shown in Figure 9-2. The utilization measures accounted for 68 percent of the

variation in resource use among episodes of otitis media. The number of contacts per episode and the number of antibiotic orders per episode accounted for 56 percent of the variation in resource use.

Seven treatment bundles can be identified which account for 67 percent of the total variation. The treatment bundles, the number of episodes, and the mean number of RVS units per episode in the treatment bundle are:

1. One Contact, No Parenteral Drug Therapy
   N=88, $\bar{y}$=2.5

2. One Contact, One or More Parenteral Drug Therapy
   N=87, $\bar{y}$=3.2

3. Two or More Contacts, 0,1 Antibiotic Orders, No Antitussive/Decongestant Order, No Parenteral Drug Therapy, N=35, $\bar{y}$=3.5

4. Two or More Contacts, 0,1 Antibiotic Orders, No Antitussive/Decongestant Orders, One or More Parenteral Drug Therapy, N=45, $\bar{y}$=4.1

5. Two or More Contacts, 0,1 Antibiotic Orders, One or More Antitussive/Decongestant, N=21, $\bar{y}$=4.3

6. Two Contacts, Two or More Antibiotic Orders,
   N=58, $\bar{y}$=4.9

7. Three Contacts, Two or More Antibiotic Orders,
   N=17, $\bar{y}$=6.1

The comparison of Figure 9-1 and Figure 9-2 shows that the inclusion of RVS units for drug orders did affect the nature of the treatment bundles identified. Drug orders for antibiotics were the second most important factor in accounting for the variation in resource use in episodes of otitis media. Increased frequency of drug orders appeared to be an important contributor to increased resource use among episodes of otitis media.

Patient, Provider, and Medical Care Process Variables

The episodes included in this analysis are those with resource use, where otitis media was the presenting morbidity at first contact, and where the attending physician at first contact was one of 17 different pediatricians. These pediatricians were the attending physician at first contact for a minimum of 45 episodes when considering all episodes of otitis media. The identification of these physicians as an independent variable is an attempt to show if individual physicians' use of resources is an important factor in accounting for variation in resource use in episodes of otitis media.

The variables included in this analysis are listed in Attachment C. It includes a variable that identifies the episodes by whether there were no comorbidities during the episode, by whether there was a respiratory/infection type comorbidity during the episode, and by whether there were morbidities other than respiratory/infectious during the episode.

Previous data have shown that the extent of resource use was strongly related to whether or not other morbidities were present during the episode of otitis media. This means that where there were no other morbidities present, otitis media was the presenting morbidity. The coding procedures require that the office visit be coded to the presenting morbidity. Thus, the resource use associated with office visits was coded to otitis media when it is the presenting morbidity. Since otitis media frequently occurs in the presence of other

were divided into three subgroups. Group 1 consisted of all episodes of otitis media in which there were no comorbidities present during the episode. There were 560 episodes identified for this group.

Group 2 consisted of all episodes in which there was a diagnosis during the episode of a co-existing respiratory or infectious disease. This group includes patients who present with other common, acute illnesses often associated with otitis media. The diseases included in this group as comorbidities were ICDA codes 470 through 527 (acute upper respiratory infections), 370 (conjunctivitis and ophthalmia), 50 through 69 (other bacterial diseases); and patients with the following symptoms: nasal discharge (non-specific), nasal congestion, sore throat, cough, or cold. There were 572 episodes in this group.

Group 3 consisted of all episodes in which a comorbidity other than those included in Group 2 was present at any contact during the episodes. There were 226 episodes in this group.

A comparison of the mean number of RVS units per episodes among these three groups indicated that the episodes with the respiratory and other infective comorbidities had fewer RVS units per episode (2.2) than the episodes with no comorbidities (2.9) or episodes with comorbidities other than those in Group 2 (2.8). The fewer RVS units per episode in Group 2 suggests the concomitant nature of the morbidities in Group 2

with otitis media to which morbidity is assigned the resource use. The results also suggest that the comorbidities present in Group 3 are coincidental to the treatment of otitis media. The differences may also reflect the more vigorous treatment of otitis media in children who have multiple morbidities present.

The results from the AID analysis including this variable are shown in Figure 9-3. These patient, provider, and medical care process variables accounted for 14.2 percent of the variation in resource use in episodes of otitis media. Individual pediatricians were the most important predictors of variation in resource use. Three groups of pediatricians were responsible for somewhat more than 60 percent of the variation in resource use accounted for. One group contained only one pediatrician. The other factors that accounted for the variation in resource use were the types of comorbidities during the episode, the number of comorbidities at first contact, the year of first contact, the status of the physician at first contact, and the type of appointment at first contact.

A second AID analysis was done with patient, provider, and medical care process variables. Only 1972 and 1973 episodes were involved and the resource use per episode included RVS units for drug orders. Episodes had resource use (RVS units greater than zero) and had otitis media as the presenting morbidity. The identities of the individual pediatricians at the first contact of the episode were not included

because of the number of episodes. The 1972 and 1973 episodes of otitis media were similar to all episodes in terms of their patient, provider, and medical care process descriptions.

The results of the AID analysis are shown in Figure 9-4. The patient, provider, and medical care process variables accounted for 14.7 percent of the variation in resource use (including drugs) among the 1972 and 1973 episodes of otitis media. The most important predictor was the type of comorbidities during the episode. This variable accounted for 4.6 percent of the variation in resource use. The other variables accounting for significant variation in resource use were age, sex, status of physician at first contact, type of symptoms at first contact, and the number of comorbidities at first contact.

The results of Figures 9-3 and 9-4 are not directly comparable as they reflect different groups of episodes, and the analysis for Figure 9-4 does not include the individual pediatricians as one of the independent variables. Nevertheless, the patient, provider, and medical process variables did not account for much of the variation in resource use in episodes of otitis media whether or not values were assigned to drug orders. It was interesting to observe that individual pediatricians were the most significant factor accounting for the variation in resource use in episodes of otitis media. They accounted for 61 percent of the variation that was explained by patient, provider, and medical care process variables.

Since the patient, provider, and medical care process variables accounted for such a small share of the variation in resource use, the log linear modeling technique was not used. Instead, the final analyses were directed to examining the treatment bundles for variation in the treatment patterns; to determining if any patient, provider, or medical care process variables can characterize the treatment bundles identified; and to exploring the variation in treatment among pediatricians grouped by extent of resource use per episode.

The seven treatment bundles identified from the 1972 and 1973 episodes were used to examine the variation in utilization variables among the bundles. Initially, among the three treatment bundles identified by having two or more contacts (treatment bundles 3, 4, and 5), only 7 percent of them had more than two contacts. Thus, bundles 3 through 6 were comprised of episodes with two contacts for care.

For the care identified as continuing office visits, all was found in treatment bundles 3 through 7. No less than 80 percent of the episodes in these treatment bundles had one or more continuing office visits with all episodes in treatment bundle 7 (highest cost bundle) having more than one continuing office visit.

Among the treatment bundles for which parenteral drug therapy was not identified as a significant factor, there was considerable variation in the use of parenteral drug therapy among episodes comprising the bundles. For example, 90 percent of the episodes in treatment bundle 5, 20 percent of the

episodes in treatment bundle 6, and about 50 percent of treatment bundle 7 had one or more parenteral drug therapies. The treatment bundles characterized by episodes with zero or one antibiotic drug order also showed variation in whether there was drug treatment. Eighty-six percent of the episodes in treatment bundle 3, 98 percent of the episodes in treatment bundle 4, and 76 percent of the episodes in treatment bundle 5 had an antibiotic drug order. Not all the episodes with two or more antibiotic orders were found in treatment bundles 6 and 7 (highest cost bundles). Thirty-two percent of the episodes in treatment bundle 2 (low cost bundle) had two or more antibiotic drug orders. Sixty percent of the episodes without antibiotic drug orders was found in treatment bundle 1 (lowest cost bundle).

Among the treatment bundles in which antitussive/decongestant drug orders were not identified as a significant factor, the use of these types of drugs appeared rather consistent with one exception. Treatment bundles 1, 6, and 7 had, respectively, 34, 34 and 41 percent of episodes with one or more antitussive/decongestant drug orders while treatment bundle 2 had only 5 percent of episodes with this type of drug order.

In summary, it appears that the least costly of the lower cost episodes (treatment bundles 1 and 2) are characterized by infrequent antibiotic treatment and frequent antitussive/decongestant drug treatment. These episodes were likely to be

the milder cases of otitis media. Among the medium cost episodes (treatment bundles 3, 4, and 5), all received antibiotic drug treatment and the most costly of these treatment bundles included antitussive/decongestant drug orders. The highest cost episodes (treatment bundles 6 and 7) had similar drug treatments and differences in cost of these episodes appeared to be due to the number of office visits. The highest cost episodes could reflect the more severe episodes of otitis media, treatment failures, or individual physician choice.

Since the patient, provider, and medical care process variables did not account for a substantial amount of the variation in resource use among episodes of otitis media, they were not substantially related to the treatment bundles identified. The types of comorbidities during the episode were significantly related to treatment bundles but no pattern to the relationship was observed. It also appeared that as the cost per treatment bundle increased, the episodes in the treatment bundles were more likely to begin with a regular attending physician.

The last analysis was an attempt to identify the variation in the patterns of resource use among three groups of pediatricians. The pediatricians were grouped according to their mean resource use per episode of otitis media. The first group included seven pediatricians with mean RVS units per episodes from 2.65 to 2.87 per episode. The second group

included nine pediatricians with mean RVS units per episode from 2.95 to 3.40 per episode. The third group consisted of one pediatrician who used an average RVS of 4.40 units per episode. These three groups accounted for 8.7 percent of the variation in resource use in all episodes of otitis media. The first group was called the low resource physicians and included 341 episodes. The second group was called the medium resource physicians and included 543 episodes. The third group was called the high resource physicians and included 32 episodes.

This analysis indicated there was a direct relationship between the three groups and the increased number of physician contacts and the increased number of continuing office visits. The low resource physicians were less likely to order parenteral drug therapy than medium or high resource physicians and the high resource physicians were more likely than medium or low resource physicians to order more than one parenteral drug therapy in an episode. Low and medium resource physicians had a similar likelihood of ordering drugs during the episodes; low resource physicians were more likely to order antitussive/decongestants than medium resource physicians. Medium resource physicians were more likely to order antibiotic drugs than low resource physicians. While laboratory procedures were used infrequently in all episodes, low and medium resource physicians had similar likelihoods of ordering laboratory procedures. Medium resource physicians were more

likely to order more than one laboratory procedure. The high resource physicians were more likely to order laboratory procedures than low or medium resource physicians.

SUMMARY AND CONCLUSIONS

This report has attempted to identify episodes of otitis media, the treatment bundles (resources used) associated with them, and the patient, provider, and medical care process variables that account for the variation in resource use among episodes of otitis media.

It was possible to identify seven different treatment bundles that accounted for 67 percent of the variation in resource use among the 1972 and 1973 episodes of otitis media 21 days or less in length. The significant predictors of resource use were the number of contacts for care, the total number of drug orders, and the number of parenteral drug orders. The latter is a subset of the total number of drug orders and, as a result, no RVS units were assigned to the specific drugs that were administered parenterally. The RVS units for parenteral drug therapy reflect the costs (personnel, facility) other than drug costs that are generated by parenteral administration of drugs.

The total number of contacts for care was the most significant predictor of resource use. The relationship was direct with the treatment bundles having from one contact to three or more contacts for care. The remaining variation in resource use was largely accounted for by the frequency of

drug orders for antibiotics and for antitussive/decongestant types of drugs. More frequent drug orders were usually associated with more frequent contacts for care. About one-half of the episodes involved a single contact, with most having one or more antibiotic orders. These were the lower cost episodes. Only about 5 percent of the episodes were in the highest cost treatment bundle. Thus, while there was variation in total costs (RVS units) per episode, the variation apparently was not due to different approaches to treatment. The variation was largely due to the more frequent use of the same procedures.

Since this variation in resource use occurred within episodes of the same duration (21 days), it suggests that either there were differences in the severity and/or complexity of episodes of otitis media being treated or that a number of episodes received too little or too much treatment. While there was an attempt to generate episodes of otitis media of similar severity and, secondly, while there was an attempt was made to account for the complexity of episodes of otitis media selected, the possibility that differences in the severity and complexity of episodes contributed to the variation in the extent of resource use among episodes could not initially be ruled out.

The findings also suggest that in episodes where drug treatment is frequent, drug costs can be a significant component of total episode costs. However, because drug

treatment is a less costly procedure than office visits, it is not as important a factor as office visits although it may be standard treatment for a disease.

Patient, provider, and medical process characteristics did not account for much of the variation in resource use among episodes of otitis media. The most important factor among these was the identity of the attending pediatricians. That most of these factors were not important suggests that clinical factors and the recognized treatment methods appear to be the major determinants of resource use in otitis media. Further, it is also possible that individual pediatricians contribute to the intensity of resource use.

The findings appear to substantiate that otitis media has a recognized method of treatment. When examined in an episodic context, the recognized methods of treatment were observed but there was some variation in the frequency of treatments. An issue raised by examining otitis media among episodes of fixed length is whether the extremes of resource use occur with sufficient frequency to be investigated.

ATTACHMENT A

During 1972, the prescriptions received by approximately 7,000 low income enrollees in the KPMCP were recorded. Although these enrollees received their prescriptions at no charge to them, each prescription was assigned a charge to represent the charge that would have been made had there been no prepaid drug benefit. The mean 1972 prescription charge for the therapeutic classes of drugs used with a diagnosis of otitis media was identified (e.g., antibiotics = $3.28, antitussive = $1.98, decongestant = $2.10). These charges were then divided by the 1972 KPMCP Fee Schedule charge of $7 for a follow-up pediatric office visit. Since this type of office visit had an RVS unit value of one, the RVS unit value per drug order by therapeutic class was calculated in the following manner:

$$\text{RVS Units per Antibiotic Drug Order} = \frac{\$3.28}{\$7.00} \times \frac{X}{1.0} = 0.47 \text{ or } \underline{0.5}$$

$$\text{RVS Units per Antitussive Drug Order} = \frac{\$1.98}{\$7.00} \times \frac{X}{1.0} = 0.28 \text{ or } \underline{0.3}$$

$$\text{RVS Units per Decongestant Drug Order} = \frac{\$2.10}{\$7.00} \times \frac{X}{1.0} = 0.30 \text{ or } \underline{0.3}$$

The RVS units for the drug orders in each therapeutic class of drugs received in episodes of otitis media was calculated in this manner.

ATTACHMENT B

Utilization Measures

1. Total Number of Contacts
   (0-9)

2. The Number of Contacts for Parenteral Drug Therapy
   (0, 1 or more)

3. The Number of First Contacts with an Office Visit
   (0, 1)

4. The number of Continuing Office Visits
   (0, 1 or more)

5. The Number of Telephone/Letter Contacts
   (0, 1 or more)

ATTACHMENT C

Patient, Physician and Medical Care Process Variables

1. Age Groups
   (0-2, 3-5, 6-8, 9-11, 12-18)

2. Sex
   (Male, Female)

3. Year
   (1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973)

4. Number of Comorbidites at First Contact
   (0, 1, 2 or more)

5. Types of Comorbidities During Episode
   (None, Respiratory/Infection-Related, Other)

6. Symptoms at First Contact
   (None, Fever, Ear-Related, Other)

7. Individual Pediatrician at First Contact
   (1-17)

8. Status of Attending Physician, First Contact
   (Regular, Temporary)

9. Time of First Contact
   (During Medical Office Hours, Other)

10. Type of Appointment, First Contact
    (Regularly Scheduled, Walk-in, Emergency Room, Telephone/Letter)

11. Status of Diagnosis, First Contact
    (Unknown, Tentative, Established)

TABLE 9-1

EPISODES OF ACUTE OTITIS MEDIA BY ICDA CODES

ICDA Code	N of Episodes	Pct. of Episodes
391.0 - Acute catarrhal otitis	184	11.8
391.2 - Otitis media without antibiotic	56	3.6
391.3 - Suppurative purulent otitis media	7	0.4
391.9 - Otitis media, unspecified, with antibiotic	1318	84.2
Total	1565	100.0

TABLE 9-2

EPISODES OF OTITIS MEDIA BY THE NUMBER OF CONTACTS PER EPISODE

Number of Contacts	N of Episodes	Pct. of Episodes	Cumulative Pct.
1	751	48.0	--
2	637	40.7	88.7
3	142	9.1	97.8
4	26	1.7	99.5
5 or more	9	0.5	100.0
Total	1565	100.0	

Range 1-9
Mean 1.7 (SE $\pm$ .02)

TABLE 9-3

EPISODES OF OTITIS MEDIA BY THE NUMBER OF OFFICE PROCEDURES IN EPISODE

Number of Procedures	Office Procedures: Initial DOV N of Eps.	Initial DOV Pct.	Follow-up DOVs N of Eps.	Follow-up DOVs Pct.	Physical Well Child N of Eps.	Physical Well Child Pct.	Telephone Calls N of Eps.	Telephone Calls Pct.
0	529	33.8	921	58.9	1559	99.6	1489	95.2
1	1036	66.2	548	35.0	6	0.4	71	4.5
2	—	—	83	5.3	—	—	5	0.3
3	—	—	10	0.6	—	—	—	—
4 or more	—	—	3	0.2	—	—	—	—
Total	1565	100.0	1565	100.0	1565	100.0	1565	100.0

TABLE 9-4

EPISODES OF OTITIS MEDIA BY NUMBER OF DRUG ORDERS IN EPISODE

Number of Drug Orders/Episode	N of Episodes*	Pct. of Episodes	Cumulative Pct.
0	39	8.2	—
1	240	50.7	58.9
2	129	27.3	86.2
3	47	9.9	96.1
4 or more	18	3.9	100.0
	473	100.0	

*Drug order data were only available for the years 1972 and 1973

TABLE 9-5

RVS UNITS FOR EPISODES OF OTITIS MEDIA BY TYPE OF PROCEDURE

Type of Procedure*		Total RVS Units	Pct. of RVS Units	Cumulative Pct.
	Surgery	29.5	0.8	—
Office	Visit	3390.5	96.9	97.7
	Other	15.0	0.4	98.1
Laboratory		46.4	1.3	99.4
Radiology		18.5	0.6	100.0
	Total	3499.9	100.0	

*Excludes drugs

TABLE 9-6

EPISODES OF OTITIS MEDIA BY TOTAL NUMBER OF RVS UNITS

RVS Units	N of Episodes	Pct. of Episodes	Cumulative Pct.
0	207	13.2	—
0.1-1.0	225	14.4	27.6
1.1-2.0	285	18.2	45.8
2.1-3.0	469	30.0	75.8
3.1-4.0	297	19.0	94.8
4.0-5.0	61	3.9	98.7
5.1 and over	21	1.3	100.0
Total	1565	100.0	

TABLE 9-7

EPISODES OF OTITIS MEDIA BY ICDA CODE AT FIRST CONTACT

ICDA Code	Group A (RVS > 0)		Group B (RVS = 0)		Both Groups	
	N	Pct.	N	Pct.	N	Pct.
391.0 - Acute catarrhal otitis	135	9.9	49	23.7	184	11.8
391.2 - Otitis media without antibiotic	28	2.1	28	13.5	56	3.6
391.3 - Suppurative purulent otitis media	6	0.4	1	0.5	7	0.4
391.9 - Otitis media, unspecified, with antibiotic	1189	87.6	129	62.3	1318	84.2
	1358	100.0	207	100.0	1565	100.0

TABLE 9-8

EPISODES OF OTITIS MEDIA BY AGE AT FIRST CONTACT

Age	Group A (RVS > 0)		Group B (RVS = 0)		Both Groups	
	N	Pct.	N	Pct.	N	Pct.
0-2	635	46.8	97	46.9	732	46.8
3-5	306	22.5	51	24.6	357	22.8
6-8	194	14.3	28	13.5	222	14.2
9-11	113	8.3	14	6.8	127	8.1
12-18	110	8.1	17	8.2	127	8.1
	1358	100.0	207	100.0	1565	100.0

TABLE 9-9

EPISODES OF OTITIS MEDIA BY NUMBER OF CONTACTS WITH COMORBIDITIES

Contacts with Comorbidity	Episode: Group A (RVS > 0) N	Group A (RVS > 0) Pct.	Group B (RVS = 0) N	Group B (RVS = 0) Pct.	Both Groups N	Both Groups Pct.
0	623	45.9	3	1.4	626	40.0
1	505	37.2	155	74.9	660	42.2
2 or more	230	16.9	49	23.7	279	17.8
	1358	100.0	207	100.0	1565	100.0

TABLE 9-10

EPISODES OF OTITIS MEDIA BY PLACES OF CONTACT

Number	Group A (RVS > 0) N	Group A (RVS > 0) Pct.	Group B (RVS = 0) N	Group B (RVS = 0) Pct.	Both Groups N	Both Groups Pct.
Medical Office Contacts						
0	175	12.9	35	16.9	210	13.4
1	562	41.4	132	63.8	694	44.3
2 or more	621	45.7	40	19.3	661	42.3
	1358	100.0	207	100.0	1565	100.0
Emergency Room Contacts						
0	1051	77.4	172	83.1	1123	78.1
1	307	22.6	35	16.9	342	21.9
	1358	100.0	207	100.0	1565	100.0

TABLE 9-11

CONTACTS BY TYPE OF APPOINTMENT PER EPISODE OF OTITIS MEDIA

Number of Contacts	Group A (RVS > 0)		Group B (RVS = 0)		Both Groups	
	N	Pct.	N	Pct.	N	Pct.
During Medical Office Hours						
0	160	10.8	32	15.5	192	12.3
1	549	40.4	129	62.3	678	43.3
2 or more	649	47.8	46	22.2	695	44.4
	1358	100.0	207	100.0	1565	100.0
Regularly Scheduled						
0	654	48.2	125	60.4	779	49.8
1	523	38.5	68	32.9	591	37.8
2 or more	181	13.3	14	6.7	195	12.4
	1358	100.0	207	100.0	1565	100.0
Walk-In						
0	458	33.7	89	43.0	547	35.0
1 or more	900	66.3	118	57.0	1118	65.0
	1358	100.0	207	100.0	1565	100.0

TABLE 9-12

MEAN NUMBER OF RVS UNITS/EPISODE BY PATIENT CHARACTERISTICS

	N of Episodes	Mean RVS Units/Episode	F Ratio and Probability
Sex			
Male	715	2.6	0.9,
Female	643	2.5	0.35
Age			
0-2 yrs	635	2.4	
3-5 yrs	306	2.6	
6-8 yrs	194	2.8	4.9,
9-11 yrs	113	2.7	.001
12-18 yrs	110	2.7	____
Number of Comorbidities at First Contact			
0	752	3.0	
1	526	2.1	111.0,
2 or more	80	1.7	.00 ____
Symptoms at First Contact			
None	505	2.2	
Fever	186	2.9	22.6,
Ear-related	570	2.8	.00
Other	97	2.7	____
Eligibility at First Contact			
Eligible	1332	2.6	1.5,
Not Eligible	26	2.3	.22

TABLE 9-13

MEAN NUMBER OF RVS UNITS/EPISODE BY PHYSICIAN CHARACTERISTICS

Physician Specialty at First Contact	N of Episodes	Mean RVS Units/Episode	F Ratio and Probability
Pediatric	1298	2.6	2.6,
All Other	60	2.8	.11
Status of Physician at First Contact			
Regular Attending	593	2.6	0.2,
Temporary Attending	765	2.6	.66
Pediatrician No.			
1	41	2.7	
2	98	2.7	
3	49	2.4	
4	95	2.5	4.9,
5	61	2.5	.00
6	62	2.7	
7	70	2.2	
8	46	3.4	
9	64	1.7	
10	62	2.6	
11	43	2.6	
12	61	2.2	
13	95	2.5	
14	103	2.4	
15	91	2.9	
16	85	2.9	
17	69	2.6	
All 17	1195*	2.6	

*Episodes with resource use where one of the 17 pediatricians was the attending physician at the first contact for the episode.

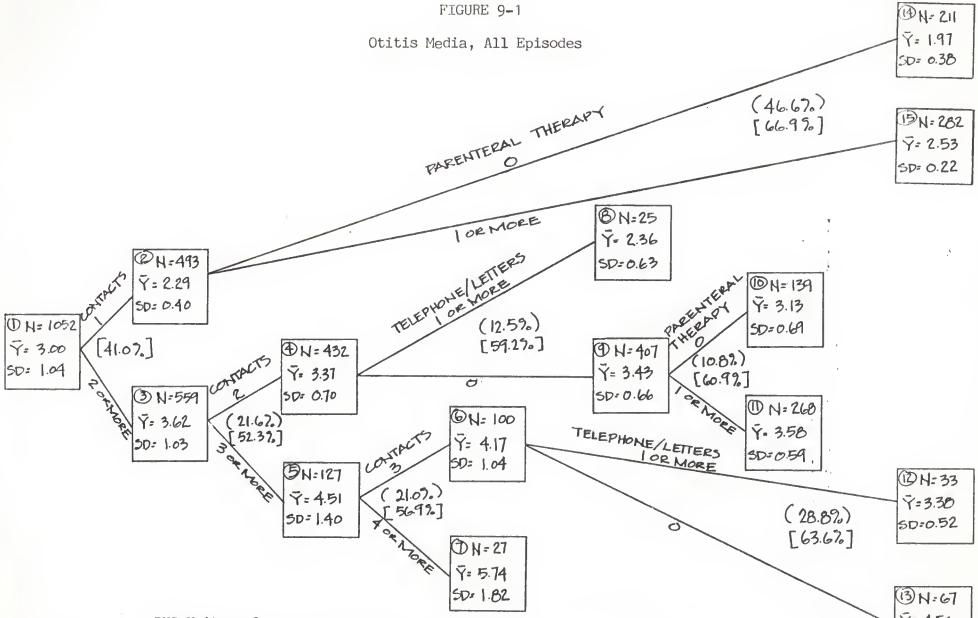
TABLE 9-14

MEAN RVS UNITS/EPISODE BY MEDICAL CARE PROCESS CHARACTERISTICS

	N of Episodes	Mean RVS Units/Episode	F Ratio and Probability
Place of First Contact			
Medical Office	1028	2.6	1.6,
Other	330	2.7	.20
Time of First Contact			
During Medical Office Hours	1076	2.6	0.2,
Other than Medical Office Hours	282	2.6	.64
Type of Appointment-First Contact			
Regularly Scheduled	207	2.2	
Walk-in	821	2.7	10.0,
Emergency Room	281	2.6	.00
Telephone/Letter	49	3.0	____
Year of First Contact			
1966	24	2.9	
1967	154	3.1	
1968	147	2.7	6.8,
1969	191	2.3	.00
1970	198	2.4	
1971	229	2.5	
1972	218	2.5	
1973	197	2.5	____
Status of Diagnosis at First Contact			
Established	1275	2.6	6.7,
Tentative	33	2.5	.001
Unknown	50	3.2	____
Return Visit Requested at First Contact			
Yes	1000	2.7	30.6,
No	355	2.3	.00

FIGURE 9-1

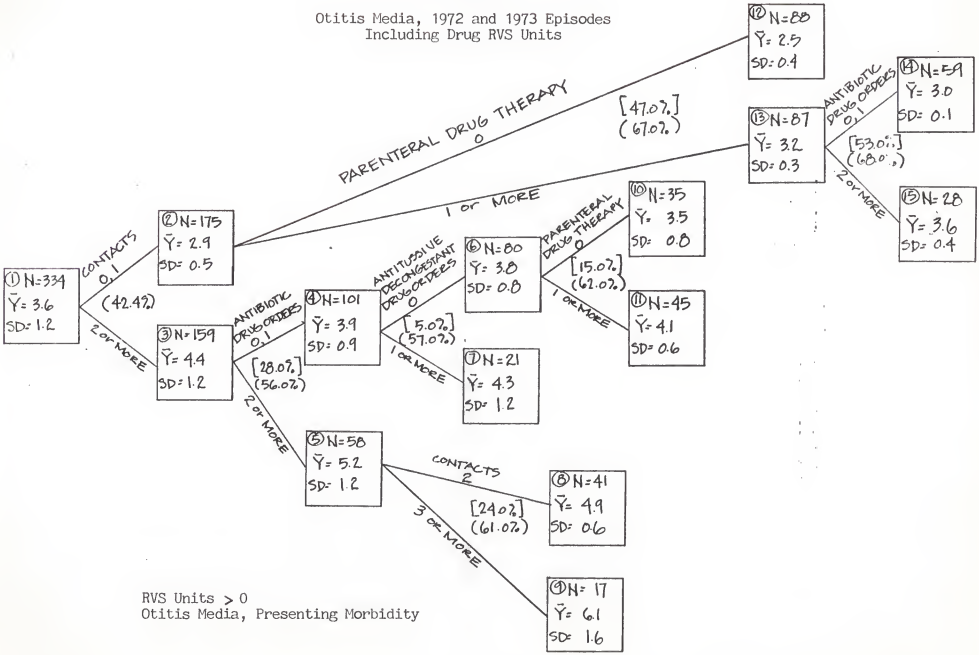
Otitis Media, All Episodes



RVS Units > 0
Presenting Morbidity Otitis Media

FIGURE 9-2

Otitis Media, 1972 and 1973 Episodes
Including Drug RVS Units



RVS Units > 0
Otitis Media, Presenting Morbidity

FIGURE 9-3

Otitis Media

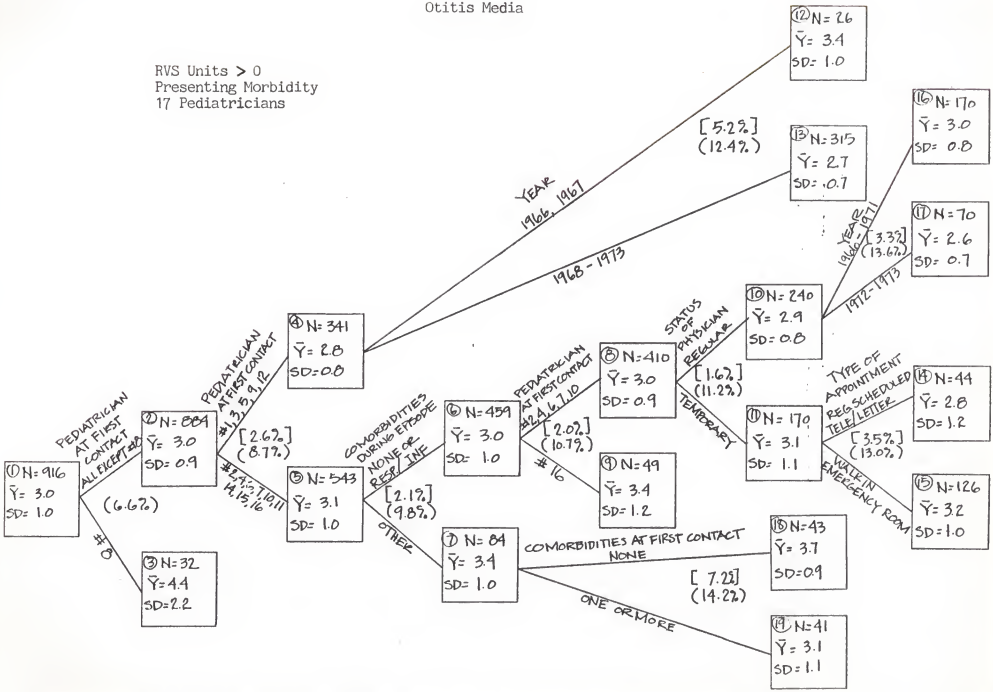
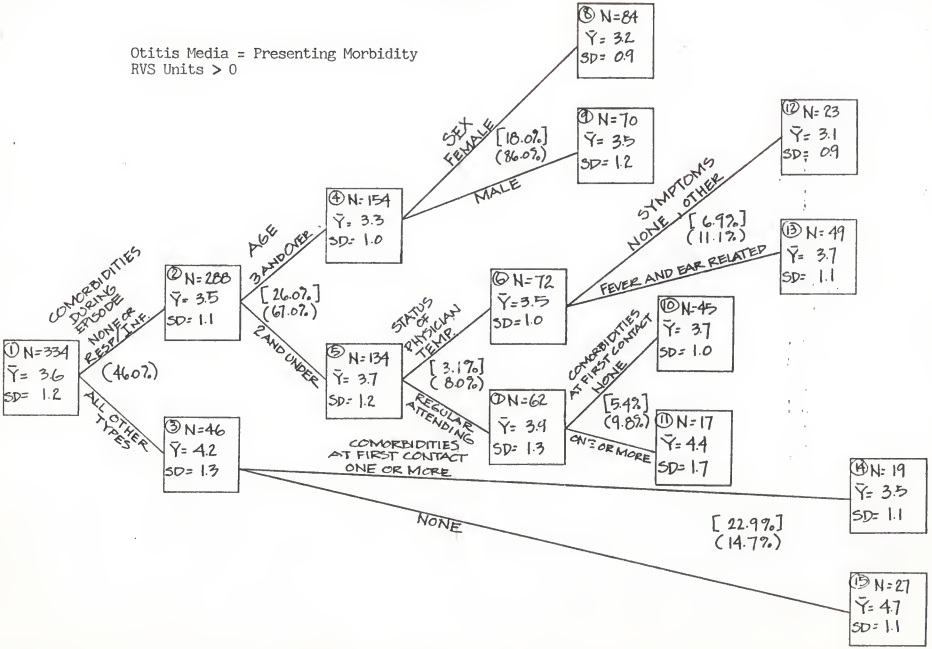


FIGURE 9-4

Otitis Media



SECTION X. FEVER OF UNKNOWN ORIGIN

Richard E. Johnson

ABSTRACT

Episodes of Fever of Unknown Origin (FUO) consisted of all contacts for care where FUO was diagnosed and a confirmed diagnosis at the time of the contact. FUO is classified as an acute disease, meaning a person could have more than one FUO episode. Duration of any episode was the time between first contact and last recorded contact for the episode.

There were 174 episodes of FUO, and 166 had resource use charged to them. Almost 70 percent of the episodes consisted of one contact for care; 11 percent lasted seven days or longer. Among the episodes with resource use, three treatment bundles were identified by the number of laboratory tests, 0, 1-2, 3 or more. These accounted for 50 percent of the variation in resource use among the episodes of FUO. Patient, provider, and medical care process characteristics accounted for 29 percent of the variation in resource use, with duration of episode being the most significant factor.

It appeared that episode costs of episodes of FUO were determined by clinical course. The longer the duration the greater the use of all types of procedures, with the exception of drug orders. Office visits and laboratory procedures accounted for almost all episode costs. Use of laboratory procedures appeared to follow a search for specific causation of the fever. No distinct treatment patterns emerged from the episode approach.

INTRODUCTION

Fever of unknown origin (FUO) becomes a diagnosis when a fever is the dominant symptom in a patient's illness and when its cause escapes detection. The textbook approach is that FUO be diagnosed only when a patient has an elevation in temperature (>101°F) for a prolonged period (two to three weeks) and if a diagnosis cannot be made during at least one week of intensive diagnostic studies.

Diagnostic studies are directed at identifying the cause of the fever whether due to infection, a neoplasm, a connective tissue disease, or some other cause. The use of diagnostic procedures provides a specific diagnosis in 90 to 95 percent of patients with prolonged febrile illness.

Therapy with drugs can be reasonable when directed at a specific suspected diagnosis, but if drug treatment is nonspecific it can generate misleading information.

METHODOLOGY

Disease and Episode Definition

Fever of unknown origin (FUO) was identified by the International Classification of Diseases, Adapted, 7th edition code 788.8. This is the only ICDA code to identify fever as a morbidity. Fever as a major presenting symptom is identified by the symptom code T010.

The medical care contacts used in this analysis were those where FUO was both identified at the first contact in

the episode and was also an updated presenting or associated morbidity. There were several instances where fever as a symptom was indicated as the presenting morbidity and FUO was indicated as the updated presenting morbidity. Such contacts were also included. This approach excludes contacts where FUO was the updated presenting or associated morbidity but was not a presenting or an associated morbidity at the first contact in the episode. It was decided that the diagnostic and treatment procedures being provided in these instances did not reflect the search for and treatment of an episode of FUO.

This approach to defining episodes of FUO is used since the manner in which the practicing physician establishes a diagnosis of FUO and the manner in which medical records abstractors record a diagnosis of FUO do not always follow a textbook approach of identifying FUO as a morbidity. In practice, FUO can be a presenting morbidity without fulfilling the two to three week symptom length or diagnostic studies criteria. The final diagnosis for such a contact need not be FUO. In addition, FUO can be identified as an updated presenting morbidity without fulfilling the criteria. In this situation, the prior contacts that are updated (given a final diagnosis) to FUO would involve procedures that may not have been intended to diagnose or to treat FUO.

The requirement that episodes of FUO begin and end with the contacts having FUO as both the presenting (primary reason) and updated morbidity (final diagnosis) means that the

diagnostic and treatment procedures coded to FUO best reflect the practitioner's intent to identify and treat FUO.

FUO is an acute disease. As a result, persons may have more than one episode. Whether a person had more than one episode was dependent upon the interpretation of the information in the medical record by the medical record technicians. The length of each episode was the number of days between the first contact and the last contact for each episode identified.

Analysis Design

The analysis of FUO initially involves a description of the episodes by measures of utilization, by patient and provider characteristics, and by medical care process characteristics.

The results of the descriptive analysis are used to empirically identify patient and provider characteristics and medical care process characteristics that have sufficient variation to potentially influence resource use in the care of FUO and to conceptually develop and identify those characteristics that might possibly influence resource use in the care of FUO.

Using total Relative Value Scale (RVS) Units as the dependent variable, each patient, provider, and medical care process variable is examined to identify whether or not the variable is significantly related to resource use (RVS units).

Using the most appropriate refined measure of resource use as the dependent variable, the Automatic Interaction

Detection (AID) program is used to determine (1) the utilization variables, and (2) the patient, provider, and medical care process variables that best explain variation in resource use. The final step is a Log Linear Multiple Classification Analysis (LLMCA) which will identify the extent to which patient, provider, and medical care process characteristics influence the likelihood of having received a given bundle of resources.

DESCRIPTIVE ANALYSIS

Episode Decription

Utilization

Table 10-1 indicates that most episodes of FUO involved few contacts per episode. Almost two-thirds of the episodes involved only one contact. The mean number of contacts per episode was 1.7 (range 1-13). More than 99 percent of the contacts involved a physician in some capacity.

Table 10-2 indicates that about 13 percent of the episodes of FUO involved a contact with a hospital admission during the episode. Given the way episodes of FUO were identified, it was assumed that FUO was the primary reason for most of the hospital admissions. However, resource use to treat FUO in the hospital is not included in this report.

Table 10-3 shows that almost 90 percent of episodes had one or more doctor office visits (DOVs) coded to the episode. The mean number of DOVs per episode was 1.1. Eight was the largest number of DOVs in an episode.

The table also shows that one-fourth of the episodes had one or more telephone or letter contacts during the episode. All but one of these contacts was a telephone contact. The mean number of telephone contacts per episode was 0.3 with four the largest number of telephone contacts in any episode.

Eighteen percent of the episodes had one or more telephone contacts in which symptoms were discussed and some action proposed. These contacts comprised 64 percent of telephone contacts. Table 10-4 shows that more than one-half of the episodes of FUO involved one or more laboratory procedures during the episode. The mean number of laboratory procedures per episode was 1.4 (range 0-13). Table 10-5 shows the number of specific laboratory procedures coded to the episodes of FUO. Three procedures (throat culture, urinalysis, WBC) accounted for almost one-half of all laboratory procedures.

Approximately 10 percent of FUO episodes had a radiology procedure coded to the episode (Table 10-6). Almost all are some type of chest x-ray.

Almost two-thirds of the episodes of FUO had one or more orders for drugs (Table 10-7). The mean number of drug orders per episode was 0.7, with three the largest number of drug orders in an episode. Approximately 84 percent of the episodes with drug orders had one drug order or more for an analgesic/antipyretic (fever suppressant) drug.

The different procedures rendered at the first contact are shown in Table 10-8. More than three-fourths of the

episodes of FUO began with an office visit and almost 13 percent began with a telephone or letter contact. An additional eight began with a hospital admission.

Drugs were a frequent treatment ordered at first contact, as were laboratory procedures. The observed pattern of procedures provided at first contact was similar to that shown for all contacts during the episodes of FUO.

Resource Use

The results of converting the procedures coded to FUO into RVS units are shown in Table 10-9. The table indicates that office procedures accounted for 60 percent of the RVS units and laboratory procedures accounted for most of the other RVS units coded to episodes of FUO. No RVS units for drug orders are included.

The total RVS units for each episode were tabulated and a frequency distribution of episodes by RVS units is shown in Table 10-10. Almost all episodes had some resource use coded to the episode. The mean number of RVS units per episode was 3.4 and the upper limit of RVS units in an episode was 20.8.

Patient Characteristics

Table 10-11 shows that somewhat more than 50 percent of the episodes occurred among males. Nearly 80 percent of the episodes involved children under 11 years of age (Table 10-12). The mean age per episode was 11 years, with a range from less than one year to 83 years of age.

Only one episode began with a person not Health Plan eligible; during the episodes of FUO, there were very few contacts by persons not Health Plan eligible.

Table 10-13 indicates that at the time of the first contact, FUO was the only morbidity presented in 69 percent of the episodes. About one-fourth of the episodes had one other morbidity at the first contact. This pattern persisted over the course of the episodes. About 64 percent of the episodes had no other morbidities present at any contact during the episode while 25 percent had at least one contact with a comorbidity during the episode.

About three-fourths of the episodes had fever as a major presenting symptom at the time of the first contact (Table 10-14). Of the 93 (65 percent) episodes for which duration of symptoms were reported, only 43 reported symptoms lasting two days or longer.

Provider Characteristics

Table 10-15 shows that most episodes (81.6 percent) of FUO began with a pediatrician. Most of the remaining episodes began with internists (14.9 percent). Pediatricians accounted for 71 percent of all contacts for FUO and internists accounted for 25 percent of all contacts for FUO. This suggests that the episodes of FUO treated by internists may have involved more contacts per episode than the episodes treated by pediatricians. It follows that episodes of FUO among children may be of different etiology than episodes of FUO among adults.

At the time of first contact, the attending physician was identified as a regular physician less than one-half of the time.

Medical Care Process Characteristics

Table 10-16 indicates that a large number of episodes of FUO invoved only one contact with the medical care system. The mean duration per episode was 3.2 days. Only one episode lasted longer than 62 days.

Table 10-17 shows the episodes of FUO by the year in which they originated. The table indicates that there were more episodes of FUO in recent years. With the exception of 1966, which includes only four months, the increase should generally reflect the growth in Health Plan membership. The reason for the small numbers of cases in 1967 is not clear.

FUO was coded as the presenting morbidity or primary reason for initiating a contact in 91 percent of the episodes (Table 10-18). In all but two of the remaining episodes, it was the first associated morbidity at the time of the first contact for FUO. Thus, FUO appears to be the major reason for the medical care contact when FUO was diagnosed.

FUO was the established diagnosis at the time of first contact for 80 percent of the episodes (Table 10-19). It was a tentative diagnosis at the first contact for an additional 14.4 percent of the episodes.

A medical office was the place of service for two-thirds of the first contacts for episodes of FUO (Table 10-20). Almost all the remaining first contacts took place in the emergency room.

Almost 70 percent of first contacts for FUO at medical offices occurred as walk-ins while about 12 percent were

regularly scheduled contacts (Table 10-20). The remaining first contacts at medical offices originated by telephone.

During episodes of FUO, about 70 percent of all contacts occurred in medical offices, with larger proportions of contacts being regularly scheduled and telephone contacts than was observed for first contacts. For all episodes, about 23 percent of contacts occurred in the emergency room, while almost 8 percent involved hospital admission. Thus, after the initial contact for FUO, regularly scheduled and telephone contacts were used more frequently and the emergency room was used less frequently as the place of service.

Almost 65 percent of first contacts for FUO occurred during medical office hours. For all episodes, 66.5 percent of all contacts occurred during medical office hours. Also at the time of first contact for FUO, about 65 percent of contacts had a return visit scheduled.

BIVARIATE ANALYSIS

This analysis examined the relationships between the number of RVS units coded to episodes of FUO and patient, provider, and medical care process characteristics.

There were seven episodes that had no RVS units assigned to them. These episodes were judged to have resource use that represented distinct treatment bundles for episodes of FUO. However, they were too few for further analysis.

The episodes included in this analysis were the 166 with RVS units assigned to them and excluding one episode with a duration of 148 days. The approach was to compare the mean

number of RVS units/episodes by patient, provider, and medical care process characteristics.

Patient Characteristics

Table 10-21 shows that episodes among females had a greater mean number of RVS units per episode than episodes among males, but the difference was not statistically significant. Table 10-22 indicates that the mean number of RVS units per episode was directly related to advancing age.

Episodes with fever as a major presenting symptom had a significantly smaller mean number of RVS units than episodes with symptoms other than fever (Table 10-23). Episodes reporting symptoms lasting longer than one day had a significantly greater number of mean RVS units than episodes reporting symptoms lasting one day (Table 10-24).

The mean number of RVS units per episode was not related to the number of comorbidities present either at the first contact or all contacts during the episode (Tables 10-25 and 10-26).

The mean number of RVS units per episode was not significantly related to the status of the diagnosis (tentative or established) (Table 10-27).

Provider Characteristics

The mean number of RVS units per episode was significantly related to the specialty of the physician at the first contact (Table 10-28). Pediatricians used the smallest mean number of RVS units per episode. The mean number of RVS units per episode was not related to the status of the provider treating the patient at first contact (Table 10-29).

Medical Care Process Characteristics

Table 10-30 shows that the mean number of RVS Units per episode was not related to the place of service for the first contact. There was also no difference in the mean number of RVS units per episode by whether or not the first contact occurred as a walk-in (Table 10-31). However, there was a significant difference in the mean number of RVS units per episode by whether or not a return visit was scheduled at the times of the first contact. The mean number of RVS units was significantly greater for episodes with a return visit scheduled (Table 10-32).

The mean number of RVS units per episode was not related to the year the episode began (Table 10-33) but was significantly and directly related to the length of the episode (Table 10-34).

In summary, the amount of resource use assigned to episodes of FUO appears to be related to the age of the member, by the nature and length of the presenting symptoms, by the specialty of the attending physician, by whether return visits are scheduled, and by the length of the episode.

AID ANALYSIS

The utilization measures and the patient, provider, and medical care process characteristics used in the analysis are attached (A and B).

The measure of resource use or dependent variable for the analysis is the total number of RVS units per episode. Duration of episode appeared to account for about 12 percent of

the variation in total RVS units per episode. While it appeared that the episodes could be grouped into those one contact in length, those one through six days in length, and those seven days or longer, the number of episodes in the latter categories were too few to permit analysis.

Another approach was to compute the rate of RVS units per day for all episodes of FUO. Since this approach also showed a relationship between resource use per episode and duration of episode, the first approach, or the total number of RVS units per episode, was chosen as the measure of resource use.

The utilization measures include a number of different groupings of laboratory procedures. These groupings were intended to reflect the search for causation of FUO. Table 10-35 shows the eight groups and the different laboratory procedures included in each group. The first five groups generally include laboratory procedures that are used to identify an infection as the cause of the FUO. The search to identify an infection as the cause can be further characterized by the combined use of a culture, blood count, and urinalysis. If infection is ruled out as the cause then the possibility of a connective tissue disease or a malignancy is pursued.

Table 10-36 shows the frequency with which these groups of laboratory procedures were used during episodes of FUO. The table indicates that almost 43 percent of the episodes had some type of culture performed and almost 20 percent had some type of blood count and urinalysis. About 8 percent of the episodes had at least one each of these three types of laboratory procedures. About 10 percent had a test for connective

tissue diseases. The remaining types of procedures were done less than 5 percent of the time.

Figure 10-1 shows that laboratory procedures were the major factor in resource use among episodes of FUO. Fifty percent of the variation in resource use was accounted for by the number of laboratory procedures. An additional 3 percent of the variation was accounted for by the number of physician contacts during the episode.

The total amount of variation in resource use accounted for by all utilization measures was 53.1 percent. Three distinct resource bundles emerged from the analysis: (1) no laboratory procedures, (2) one or two laboratory procedures, and (3) three or more laboratory procedures.

The results of the AID analysis with the number of drug orders included as an independent variable are shown in Figure 10-2. Although the sample size for this analysis is small since it included only episodes of FUO occurring in 1972 and 1973, the results are similar to those shown in Figure 10-1. The number of laboratory procedures received was responsible for the explained variation in resource use. The number of drug orders received did not appear to influence resource use. However, it should be noted that only 64 episodes were included in this analysis.

Patient, Provider, and Medical Care System Characteristics

Figure 10-3 shows that these types of variables explained about 29 percent of the variation in resource use. As was

expected, the length of the episode accounted for almost 19 percent of the variation in resource use. In addition, for episodes of five days or less in duration, whether or not a return visit was scheduled accounted for an additional 4.8 percent of the variation. An additional 3.4 percent of the variation was accounted for by whether or not symptoms were reported at the first contact. The year the episode began and the age of the person at the time of the first contact were other variables that helped explain the variation in resource use. Their total contribution was, however, less than 2 percent.

Figure 10-1 shows the number of laboratory procedures accounted for 95 percent of the variation in resource use that was explained by the utilization measures. The three treatment bundles involved, the number of episodes, and the mean number of RVS units per episode were:

1. No laboratory procedures, $N = 75$, $\bar{y} = 2.0$
2. One or two laboratory procedures, $N = 63$, $\bar{y} = 3.7$
3. Three or more laboratory procedures, $N = 28$, $\bar{y} = 7.4$

FURTHER ANALYSES

Among these treatment bundles there is a direct relationship between number of laboratory services and RVS units. Instead of using a log linear model technique, the three treatment bundles were cross tabulated with other utilization variables to determine if increased resource use among the bundles was attributable to the more frequent use of other services and procedures as well as laboratory work. The

treatment bundles were also cross tabulated with the patient, provider and medical care process variables to see if these variables were able to characterize the episodes in the specific treatment bundles.

There was a direct relationship between the three treatment bundles and the number of office visits per episode (Gamma = 0.47) and the number of radiology procedures per episode (Gamma = 0.74). Episodes with the highest resource use (treatment bundle 3) were also more likely to have: more hospital admissions, more physician contacts, more telephone/letter contacts, and fewer contacts with drug orders during the episodes than episodes with less resource use (treatment bundles 1 and 2). Thus, greater resource use in episodes of FUO appears to be attributable to the greater frequency of all types of services and procedures other than drug orders.

The specific laboratory tests that were received by treatment bundles 2 and 3 were also compared. Eighty percent of episodes with treatment bundle 2 (one or two laboratory procedures) and 70 percent of episodes with treatment bundle 3 had a culture during the episode. Treatment bundle 3 episodes, however, were more likely to have two or more cultures during the episode (14.3 vs. 1.6 percent).

Eleven percent of treatment bundle 2 episodes received a blood count. No bundle 2 episodes received more than a single blood count. Almost 86 percent of treatment bundle 3 episodes had a blood count of some type, and 68 percent received more than one.

Twenty-two percent of treatment bundle 2 episodes received one or more urinalyses compared with 68 percent of episodes in treatment bundle 3. All tests for connective tissue disease were received by treatment bundle 3 episodes. Almost one-half of treatment bundle 3 episodes had a culture, blood count, and urinalysis during the episode. Thus, the laboratory resources in treatment bundle 3 appeared to be associated with the use (vs. no use) of connective tissue disease tests and with the more frequent use of urinalyses, cultures and blood counts.

When the three treatment bundles were cross tabulated with the patient, provider, and medical care process variables, age (Gamma = 0.34), and duration of episode (Gamma = 0.50) were most strongly related to the treatment bundles. Greater resource use among the treatment bundles was directly related to increased age and longer lengths of episodes. For the most part, the remaining variables showed little difference between treatment bundles 1 and 2. When treatment bundle 3 was compared with treatment bundles 1 and 2, some differences were observed. The comparison indicated that, in addition to being related to episodes among the older persons and to episodes with longer duration, episodes in treatment bundle 3 were more likely to involve females; not to have fever reported as a symptom at the first contact; to have reported major symptoms lasting longer; to have more contacts during office hours; and to have one or more comorbidities during the episode. Episodes with treatment bundle 3 were

also more likely to have the diagnosis established at first contact for the episode.

These results suggest that the treatment bundles largely reflect the search for causation of the FUO, and the longer the episode and the older the patient, the more varied and frequent the use of laboratory services. The use of other types of services does not appear to show any unique treatment patterns, but appears to be in general directly related to the use of laboratory procedures. The one exception appears to be drug treatment. However, the relationship was not significant, there were no RVS units attached to drug treatment, and only episodes in 1972 and 1973 were included.

While the results of the cross tabulations generate these assertions, they do not indicate the relative importance of each of the services in accounting for variation in resource use among episodes of FUO. It would be useful to determine the relative independent contributions of the major services and to further determine if these contributions appear to be affected by the duration of episodes and age of patients.

To do so, regression analyses were done using the total number of RVS units per episode as the dependent variable and the use of each major service as the independent variables. The utilization variables included and the results of the regression analyses are shown in Table 10-37.

The table shows that the use of laboratory procedures made the most significant contribution to explaining variation in resource use regardless of duration of episode or age of patient. The number of laboratory procedures was a better

predictor in shorter episodes and among patients 15 years of age and over (nonpediatric episodes).

The number of radiology procedures and the number of office visits also contributed to the variation in resource use after accounting for laboratory procedures regardless of duration of episode or age of patient. The number of laboratory procedures made the greatest contribution in episodes lasting one day or longer (16.3 percent) while the number of office visits made the greatest contribution in pediatric episodes (12.2 percent).

The number of telephone/letter contacts was a significant factor among episodes of one day or longer and in pediatric episodes. The contribution of telephone/letter contacts was greatest (3.2 percent) for episodes lasting one day or longer.

The number of hospital admissions was a significant factor only among episodes one contact in length and contributed 1.4 percent to the total variation accounted for in such episodes.

SUMMARY AND CONCLUSIONS

The approach to establishing episodes of FUO was an attempt to identify episodes of comparable severity at the initial contact for the episode. Since FUO had to be both the presenting morbidity and the final diagnosis for each contact during the episode, it was assumed that fever was a presenting symptom whether or not it was recorded in the medical record. This approach did, however, generate episodes of FUO where the

accepted clinical criterion of fever of two to three weeks duration for diagnosing FUO was either not present or not reported. Most episodes generated by this approach were of very short duration. In addition, almost two-thirds of the episodes had a return visit requested at the time of the first contact for FUO. While these data would suggest a substantial degree of homogenity among episodes in terms of severity of the morbidity, they do not appear to be sufficient to completely rule out the potential of severity of the disease contributing to variations in diagnostic and treatment patterns during the episode.

The approach to establishing the episodes of FUO also maximized the probability of generating episodes where the resources used during a contact were attributable to the diagnosis and treatment of FUO. This means that the resource use coded to FUO provides as close as possible an estimate of the costs of episodes of FUO.

Three treatment bundles for FUO were identified among the episodes. The number of laboratory procedures per episode was the most significant factor in grouping episodes by the amount of variation in resource use explained. Episodes in these groups or treatment bundles accounted for approximately 50 percent of the variation in resource use among episodes of FUO. Among these treatment bundles, increased numbers of laboratory procedures were related to increased mean resource use per episode.

When all episodes were considered in a regression analysis, the number of laboratory procedures per episode was again the most significant factor in accounting for the variation in resource use. In addition, the number of radiology procedures and the number of office visits also independently contributed to accounting for the variation in resource use. These three variables accounted for 77 percent of the variation in resource use among all episodes of FUO.

It was not possible to ascertain the contribution of drug treatment in accounting for the variation in resource use among episodes of FUO. As previously indicated, drug treatment data were collected only for episodes in 1972 and 1973 and there were no values (RVS units) assigned to drug orders. However, since more than 50 percent of the episodes had one or more drug orders, the impact of drug treatment upon total resource use and the potential impact upon explaining the variation in resource use in episodes of FUO could be substantial.

The number of laboratory procedures per episode and the number of office visits per episode did not refine the groups of episodes or treatment bundles and further account for the varition in resource use among the episodes. The reason appears to be the limited total number of episodes of FUO for analysis and not the lack of potential effect of these utilization measures upon total resource use. There were data that showed mean resource use per treatment bundle was directly related to the number of radiology and office procedures per

episode. Increased numbers of telephone/letter contacts and increased numbers of hospital admissions per episode were also characteristic of the treatment bundle with highest mean resource use.

These data lead to the assertion that variation in the extent of resource use among episodes of FUO results from the clinical course of the morbidity and not from different approaches to diagnosis and treatment of FUO. As the fever persists, the extent of major types of resources (laboratory, radiology, office visits) used in seeking causation and in providing treatment will increase directly as the symptoms persist. That duration of episode was the most significant patient, provider, and medical care process variable, with increased resource use per episode directly related to longer lengths of episodes, further support the assertion.

The apparent pattern with laboratory procedures--the most significant resource used in terms of potential costs--was to order the same tests again (cultures, urinalysis) and to also order additional types of tests (blood counts, connective tissue disease tests). The most common radiology procedure was a chest x-ray. Drug treatment was more likely with treatment bundles having less resource use. This pattern may reflect the therapeutic response to drug therapy of fever in low cost episodes, and the greater use of costly diagnostic services in higher cost episodes. The types of drugs most frequently ordered were analgesics and antipyretics, both fever reducers and only palliative in effect.

The assertion is further supported by the data indicating that a return visit was requested at the time of the first contact in 65 percent of the episodes although 69 percent of the episodes were only one contact in length. This shows that a substantial number of the episodes with a return visit requested had no return visit recorded. In these episodes, the fever could have subsided prior to the date indicated for the return visit, negating any need for further treatment. Episodes with a return visit requested however, were also more likely to have a return visit than episodes without a return visit requested.

In addition, when FUO episodes were divided into those one contact in length and those one day or longer in length, the number of laboratory tests, radiology procedures, and office visits were significant and similar predictors of resource use for both types of episodes. With longer episodes, the number of office visits explained a somewhat larger amount of variation than they did with one contact episodes. This further suggests that longer episodes generally consisted of the more frequent use of all major types of services.

The patient, provider, and medical care process variables accounted for about 29 percent of the variation in resource use among episodes of FUO. The most significant factor was duration of episode. Having a return visit scheduled and having no symptoms reported at first contact accounted for most of the remaining variation.

Given the assertion that the clinical course of the morbidity determined the length of the episode, the relationships of patient, provider, and medical care process variables were investigated among all episodes one contact in length and among all episodes more than one contact in length. Among episodes one contact in length, the most significant factor was whether a return visit was scheduled, accounting for about 20 percent of the variation in resource use. No other patient, provider, or medical care process variable was a significant factor in accounting for the variation in resource use. This finding suggests that among these episodes there may have been some variation in the physician's perceptions of the severity of the symptoms at the contact.

Among episodes with durations of more than one contact, the patient, provider, and medical care process variables accounted for 50 percent of the variation in resource use. Three variables were significant factors and accounted for 36 percent of the variation. The most significant factor was being treated by a pediatrician at first contact. Being treated by a pediatrician was related to lower resource use per episode. The other two factors were the number of comorbidities during the episode and the duration of the episode. Increased numbers of comorbidities were related to lower resource use per episode while increased length of episode was related to higher resource use per episode. This latter relationship further suggests the pervasive effect of the clinical course of the morbidity upon resource use.

The various analyses of episodes of FUO lead to the conclusion that variation in resource use in episodes of FUO as established was largely dependent upon the clinical course of the morbidity once diagnosed. No distinct patterns of care emerged except that more resources of all types were used as symptoms persisted. This suggests that an episodic approach to analysis of resource use for FUO may not be a useful approach. However, it must be remembered that the episode definition did not generate episodes of FUO that met the clinical criteria for establishing FUO as a diagnosis. The most appropriate approach to investigating resource use for FUO in an episode context would be to identify for analysis episodes that last a minimum of two weeks. Such episodes would be most likely to reveal if there is variation in resource use to diagnose and treat FUO.

Attachment A

Utilization Measures

1. No. of Hospital Admissions in Episode
   (0, 1 or more)

2. No. of Physician Contacts in Episode
   (1, 2, 3, 4, 5 or more)

3. No. of DOVs (Initial and Followup) in Episode
   (0, 1, 2, 3 or more)

4. No. of Telephone and/or Letter Contacts in Episode
   (0, 1, 2 or more)

5. No. of Symptom-Related Telephone Contacts in Episode
   (0, 1 or more)

6. No. of Radiology Procedures in Episode
   (0, 1 or more)

7. No. of Laboratory Procedures in Episode
   (0, 1, 2, 3-5, 6 or more)

8. No. of Cultures in Episode
   (0, 1, 2 or more)

9. No. of Blood Counts in Episode
   (0, 1, 2, 3 or more)

10. No. of Urinalysis in Episode
    (0, 1 or more)

11. Episode with Culture, Blood Count and Urinalysis in Episode
    (Yes, No)

12. No. of Connective Tissue Disease Test in Episode
    (0, 1 or more)

13. No. of Drug Orders in Episode (1972 and 1973)
    (0, 1, 2 or more)

Attachment B

Patient, Physician and Medical Care Process Variables

1. Sex of Member

2. Age at Time of First Contact for FUO
(Under 5 years of age, 5-19, 20 and over)

3. Presenting Symptom
(Fever, Other than fever, or no presenting symptom)

4. Length of Presenting Symptom
(No symptoms reported, one day, longer than one day or no length reported)

5. Status of Diagnosis at First Contact
(Established, Tentative, Unknown)

6. Contacts with Comorbidities
(None, 1, 2 or more)

7. Physician Specialty at First Contact
(Pediatrics, Internal Medicine, Other)

8. Place of Service for First Contact
(Medical Office, Emergency Room, Telephone-Letter, Hospital)

9. Type of Appointment
(Walk-in, Other than Walk-in)

10. Time of Appointment
(During Medical Office Hours, Not During Medical Office Hours)

11. Return Visit Scheduled at First Contact
(Yes, No)

12. Year of First Contact
(1966, 67 and 68, 1969, 1970, 1971, 1972, 1973)

13. Duration of Episode
(One Contact, One Day, 2-5 Days, 6 Days or Longer)

TABLE 10-1

Episodes of Fever of Unknown Origin (FUO) by
Total Number of Contacts in Episode

No. of Contacts	N	%	Cum %
1	112	64.4	64.4
2	36	20.7	85.1
3	12	6.9	92.1
4	8	4.6	96.6
5 or more	6	3.4	100.0
Total	174	100.0	

Range 1-13
Mean 1.7 $\pm$ 0.1 (SE)
Median 1.3

TABLE 10-2

Episodes of FUO by the Number of
Hospital Admissions in the Episode

Hospital Admissions	N	%	Cum %
0	152	87.3	87.3
1	21	12.1	94.4
2	1	0.6	100.0
Total	174	100.0	

TABLE 10-3

Episodes of FUO by Number of
Office Procedures in Episode

Episodes with DOVs (Initial & Followup)			Episodes with Telephone-Letter Contacts	
N (DOVs)	N (episodes)	%	N	%
0	20	11.5	130	74.7
1	132	75.9	32	18.4
2	15	8.6	9	5.2
3	5	2.9	2	1.1
4	1	0.6	1	0.6
5 or more	1 (8)	0.6	0	0.0
1 or more	154	88.5	44	25.3

TABLE 10-4

Episodes of FUO by Number of
Laboratory Tests in Episode

Laboratory Test	N	%	Cum %
0	83	47.7	47.7
1	43	24.7	72.4
2	20	11.5	83.9
3-5	18	10.3	94.2
6 or more	10	5.8	100.0
Total	174	100.0	

Range 1-13
Mean 1.4 + 0.2 (SE)
Median 0.6

TABLE 10-5

Number of Specific Laboratory
Procedures for Episodes of FUO

Laboratory Procedure	N	%	Cum %
Throat Culture	56	22.9	22.9
Complete Urinalysis	39	15.9	38.8
WBC	26	10.6	49.4
Differential Blood Smear	22	9.0	58.4
Culture (blood and urine)	20	8.2	66.6
Creatinine Clearance	18	7.3	73.9
CBC	10	4.1	78.0
Other	54	22.0	100.0
Total	245	100.0	

TABLE 10-6

Episodes of FUO by
Number of Radiology Procedures in Episode

Radiology Procedures	N	%
0	156	89.7
1	18	10.3
Total	174	100.0

TABLE 10-7

Episodes of FUO by Number
of Drugs Ordered in Episode*

Drugs Ordered	N	%	Cum %
0	25	37.3	37.3
1	35	52.2	89.5
2 or more	7	10.5	100.0
Total	67*	100.0	

Range 1-3

*Drug order data available for only 1972 and 1973.

TABLE 10-8

Episodes of FUO by Different Procedures Provided
at First Contact for Episode

	N	%
Physician Office Visit	134	77.0
Telephone-Letter	22	12.6
Laboratory Tests	76	43.7
Radiology	13	7.5
Hospital Admission	14	8.0
Drug Order*	39	58.2

*1972 and 1973 episodes only.

TABLE 10-9

RVS Units by Procedure*
Assigned to Episodes of FUO

	Procedure	RVS Units	%	Cum %
Office	Visit	332	56.0	56.0
	Phone-Letter	18	3.0	59.0
	Other	6	1.0	60.0
	Laboratory	191	32.2	92.2
	Radiology	46	7.8	100.0
	Total	593	100.0	

*Excludes drugs ordered.

TABLE 10-10

Episodes of FUO by Total RVS Units in Episode

Total RVS	N	%	Cum %
0	7	4.0	4.0
0.1 - 0.9	7	4.0	8.0
1.0 - 1.9	10	5.7	13.7
2.0 - 2.9	62	35.6	49.3
3.0 - 3.9	42	24.1	73.4
4.0 - 5.9	25	14.4	87.8
6.0 - 7.9	11	6.5	94.3
8.0 and over	10	5.7	100.0
Total	174	100.0	

Range 0 - 20.8
Mean 3.4 $\pm$ 0.2 (SE)
Median 3.0

TABLE 10-11

Episodes of FUO by Sex

Sex	N	%
Male	94	54.0
Female	80	46.0
Total	174	100.0

TABLE 10-12

Episodes of FUO by Age at First Contact for Episode

Age	N	%	Cum %
Less than 5	98	56.3	56.3
5-9	38	21.8	78.1
10-19	11	6.3	84.4
20-44	11	6.3	90.7
45 and over	16	9.3	100.0
Total	174	100.0	

Range - less than 1 year to 83
Mean 1.9 ± .01 (SE)
Median 1.4

TABLE 10-13

Episodes of FUO by the Number of Comorbidities at the First Contact for the Episode

Comorbidities	N	%
0	120	69.0
1	43	24.7
2	9	5.2
3	2	1.1
Total	174	100.0

TABLE 10-14

Episodes of FUO by the Number of Episodes with Fever or FUO a Major Presenting Symptom at the Time of First Contact

Symptom	N	%
Fever or FUO	133	76.4
No Fever or FUO	41	23.6
Total	174	100.0

TABLE 10-15

Episodes of FUO by Physician Specialty
at First Contact for Episode

Specialty	N	%	Cum %
Pediatrics	142	81.6	81.6
Internal Medicine	26	14.9	96.5
Other*	6	3.5	100.0
Total	174	100.0	

*Includes Surgery, Emergency and Urology

TABLE 10-16

Episodes of FUO by Length of Episodes in Days

Days	N	%	Cum %
1 contact	121	69.5	69.5
1-6 days	33	19.0	88.5
7 days or more	20	11.5	100.0
Total	174	100.0	

Range 1-62
Mean 3.2 + 1.0 (SE)
Median 0.2

TABLE 10-17

Episodes of FUO by Year of First Contact for Episode

Year	N	%	Cum %
1966	9	5.2	5.2
1967	2	1.1	6.3
1968	20	11.5	17.8
1969	27	15.5	33.3
1970	20	11.5	44.8
1971	29	16.7	61.5
1972	30	17.2	78.7
1973	37	21.3	100.0
Total	174	100.0	

TABLE 10-18

Episodes of FUO by the Morbidity Status at the First Contact for the Episode

Morbidity Status	N	%
Presenting	158	90.8
First Associated	14	8.0
Second Associated	2	1.2
Total	174	100.0

TABLE 10-19

Episodes of FUO by Status of Diagnosis at First Contact for Episodes

Status	N	%
Established	140	80.5
Tentative	25	14.4
Unknown	9	5.1
Total	174	100.0

TABLE 10-20

Episodes of FUO by Place of Service and Type of Appointment at First Contact for Episode

Place and/ or Type	N	%	Cum %
Medical Office — Regularly Scheduled	14	8.0	8.0
Medical Office — Walk in	83	47.7	55.7
Medical Office — Telephone/ Letter	21	12.1	67.8
Emergency Room	52	29.9	97.7
Hospital Admission	4	2.3	100.0
Total	174	100.0	

TABLE 10-21

Mean RVS Units per Episode of FUO by Sex

Sex	N	Mean RVS Units/Episode
Male	88	3.3
Female	78	3.8
Total	166	3.6

F = 1.6, p = .26

TABLE 10-22

Mean RVS Units per Episode of FUO by Age at First Contact During Episode

Age	N	Mean RVS Units/ Episodes
Under 5 years of age	95	3.0
5-9 years	38	3.5
10-19 years	10	4.1
20-44 years	8	6.0
45 years and over	15	5.9
Total	166	3.6

$F = 6.2$, $p = <.001$, $r = .36$

TABLE 10-23

Mean RVS Units per Episode of FUO by First Presenting Symptom

First Presenting Symptom	N	Mean RVS Units/ Episodes
Fever	126	3.2
Other than Fever	40	4.7
Total	166	3.6

$F = 9.8$, $p = .002$

TABLE 10-24

Mean RVS Units per Episode of FUO by
Length of First Presenting Symptom

Length	N	Mean RVS Units/ Episode
One day	52	2.7
More than one day	41	4.2
Total	93	3.6

$F = 7.9$, $p = .006$

TABLE 10-25

Mean RVS Units per Episode of FUO by Number of
Comorbidities at First Contact During Episode

Number of Comorbidities	N	Mean RVS Units/ Episode
None	120	3.7
One	38	2.9
Two or three	8	4.2
Total	166	3.6

$F = 1.4$, $p = .25$, $r = -.06$

TABLE 10-26

Mean RVS Units per Episode of FUO by Number of Contacts with Comorbidities During Episode

Contacts with Comorbidities	N	Mean RVS Units/ Episode
None	111	3.5
One	37	3.3
Two or More	18	4.4
Total	166	3.6

F = 1.0, p = .36, r = .07

TABLE 10-27

Mean RVS Units per Episode of FUO by Status of Diagnosis at First Contact During Episode

Status of Diagnosis	N	Mean RVS Units/ Episode
Established	135	3.5
Tentative	23	4.8
Unknown	8	3.5
Total	166	3.6

F = 0.91, p = .40

TABLE 10-28

Mean RVS Units per Episode of FUO by Physician Specialty at First Contact During Episode

Physician Specialty	N	Mean RVS Units/ Episode
Pediatrics	139	3.2
Internal Medicine	21	5.8
All Other	6	4.8
Total	166	3.6

F = 10.0, p = <.001

TABLE 10-29

Mean RVS Units per Episode of FUO by Status of Physician at First Contact During Episode

Physician Status	N	Mean RVS Units/ Episode
Regular attending	74	3.8
Temporary attending	92	3.3
Total	106	3.6

F = 1.5, p = .23

TABLE 10-30

Mean RVS Units per Episode of FUO by Place of Service at First Contact During Episode

Place of Service	N	Mean RVS Units/ Episode
Medical Office	92	3.9
Emergency Room	51	3.0
Telephone-Letter	21	3.6
Hospital	2	1.6
Total	166	3.6

F = 13.0, p = 0.16

TABLE 10-31

Mean RVS per Episodes of FUO by Type of Appointment at First Contact During Episode

Type of Appointment	N	Mean RVS Units/ Episode
Walkin	80	3.7
Other than Walkin	86	3.4
Total	166	3.6

F = 0.6, p = 0.42

TABLE 10-32

Mean RVS Units per Episode of FUO by Whether Return Visit Requested at First Contact During Episode

Return Visit	N	Mean RVS Units/ Episode
Requested	107	4.1
Not Requested	56	2.4
Total	166	3.6

F = 15.9, p = <.001

TABLE 10-33

Mean RVs Units per Episodes of FUO by Year of First Contact

Year	N	Mean RVS Units/ Episode
1966,67,68	29	3.1
1969	25	3.8
1970	15	2.9
1971	29	4.1
1972	29	3.6
1973	35	3.6
Total	166	3.6

$F = 0.7$, $p = 0.66$, $r = .05$

TABLE 10-34

Mean RVS Units per Episode of FUO by Length of Episode

Length of Episode	N	Mean RVS Units/ Episode
1 contact	114	2.8
1 day	18	4.0
2-5 days	15	4.7
6-13 days	11	6.1
14 or more days	8	7.9
Total	166	3.6

$F = 13.7$, $p = <.001$

TABLE 10-35

Groupings of Laboratory Procedures

1. Cultures (Throat, Urine blood, Spinal fluid, other)
2. Blood Counts (WBC, CBC, Diff. blood smear, Platelets, Hemoglobin, CSF)
3. Urinalysis (Urinalysis)
4. Antibody Studies (sed. rate, heterophile, Rubella, febrile aggluntination)
5. Blood Chemistries (alkaline phosphatase, SGOT, bilirubin total bilirubin)
6. Connective Tissue Tests Disease (creatinine clearance, creatinine, blood or urine, antinuclear antibodies, LE prep, Rh factor)
7. Malignancy Tests (serum CA, acid phosphatase, stool, blood)
8. Other (serum K, glucose, EKG)

TABLE 10-36

Percent of Episodes of FUO with Specific Groups of Laboratory Procedures

Laboratory Procedures	Percent of Episodes with 0	1	2	3	4	5 or More
Cultures	57.2	39.8	2.4	0.0	0.6	0.0
Blood Count	81.9	6.0	8.4	2.4	0.6	0.6
Urinalysis	80.1	17.5	1.8	0.6	0.0	0.0
Antibody Screens	95.2	3.6	1.2	0.0	0.0	0.0
Blood Chemistries	95.8	1.2	0.6	1.2	1.2	0.0
Connective Tissue Disease-Related	89.8	7.8	1.2	1.2	0.0	0.0
Malignancy-Related	97.6	2.4	0.0	0.0	0.0	0.0
Other	98.8	0.6	0.6	0.0	0.0	0.0

Table 10-37

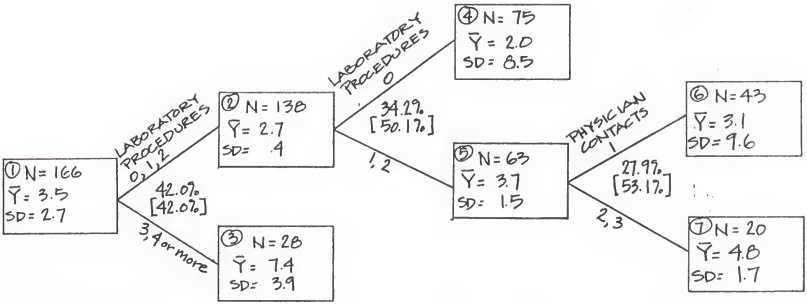
Regression Analyses of Episodes of FUO

	All Episodes		Episodes: One Contact		Episodes: One Day or Longer		Episodes: Less than 15 Years of Age		Episodes: 15 Years of Age and Over	
	N = 166		N = 114		N = 52		N = 140		N = 26	
Type of Service	Beta Coeff.	R^2 Chg.	Beta Coeff.	R^2 Chg.	Beta Coeff.	R^2 Chg.	Beta Coeff.	R^2 Chg.	Beta Coeff.	R^2 Chg.
Number of Laboratory Procedures	.554**	.574	.694**	.602	.526**	.515	.540**	.559	.653**	.649
Number of Radiology Procedures	.346**	.140	.303**	.109	.395**	.163	.401**	.172	.221	.100
Number of Office Visits	.235**	.053	.217**	.058	.239**	.042	.361**	.122	.154	.016
Number of Telephone/ Letter Contacts	.098*	.009	-.030	.000	.181*	.032	.068*	.005	.160	.007
Number of Hospital Admissions	.005	.000	.120*	.014	—	a	.035	.001	-.091	.004
		r^2=.776		r^2=.784		r^2=.751		r^2=.860		r^2=.776

** - F to remove significant at $p \leq .01$
* - F to remove significant at $p \leq .05$
a - Did not enter regression equation

FIGURE 10-1

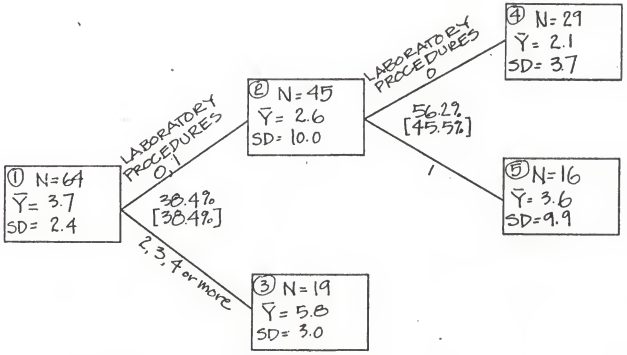
Episodes of FUO by Utilization Variables



$\bar{Y}$ = Mean RVS Units/Episode
RVS Units > 0

FIGURE 10-2.

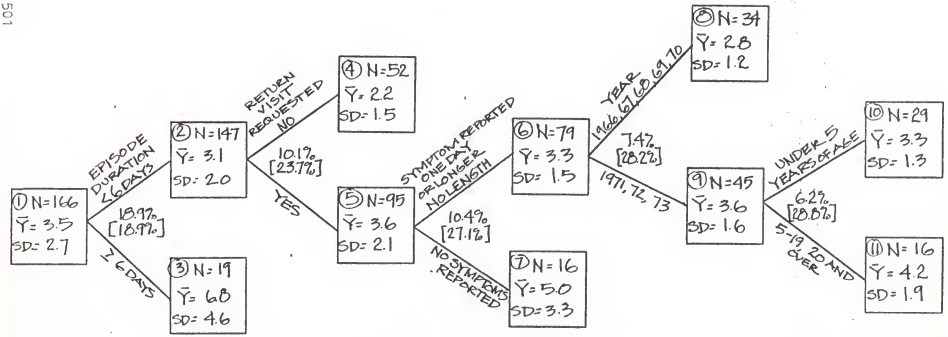
Episodes of FUO (1972 and 1973) by Utilization Variables



$\bar{Y}$ = Mean RVS Units Per Episode
RVS Units > 0

FIGURE 10-3

Episodes of FUO by Patient, Provider, and Medical Care Process Variables



$\bar{Y}$ = Mean RVS Units/Episode
RVS Units > 0

SECTION XI. DEPRESSION

Michael McCally and Rhesa Lee Penn

ABSTRACT

Episodes of depression consisted of contacts by a patient for care where three criteria were met: 1) at least one contact in the episode had depression as an established rather than as a tentative or unknown diagnosis; 2) each episode had at least two contacts for care; and 3) the patient was at least 16 years of age. Depression was classified as a chronic disease; there was only one episode per person. Two hundred eighty-one episodes were identified for analysis.

The mean number of contacts per episode was 7.1 with a maximum of 64 contacts. The mean cost per episode was 43.71 with a maximum cost of $819.50. Twenty two percent of the episodes had no costs charged to them. Office visits accounted for 84.7 percent of total costs excluding drug costs.

Five bundles of care accounted for 57.1 percent of the variation in episode costs. Most of the variation in episode costs was attributable to the number of mental health contacts in the episode.

The different bundles of care represented both quantitatively and qualitatively different patterns of care for depression. There appeared to be a tradeoff between the use of drug treatment and psychotherapy as well as between care provided by mental health and other professionals.

Episodes with depression as the primary reason for the visit; those without life threatening, chronic illness, or mental illness other than depression; those with longer durations; and those with psychiatrist, psychologist, social worker, or consultant contacts were likely to have higher episode costs.

I. INTRODUCTION

This report describes the utilization of resources in the provision of ambulatory care to patients during episodes of depression. It is based on data from computerized outpatient medical records of a 5 percent sample of all subscriber units in the Kaiser-Permanente Medical Care Program (KPMCP or Health Plan), Oregon Region, between September 30, 1966 and December 31, 1973.

A. Disease Definition

Depression is a disorder of mood characterized by anhedonia, difficulty of thinking, disturbances of appetite or sexuality or sleep, psychomotor retardation, and feelings of guilt or worthlessness. Depression may be mild, transient, and limited to mood, or severe and prolonged with major functional impairment, psychosis, or suicide. Depression may be exogenous, as in reaction to divorce or death, or endogenous, with no apparent outside cause.

The diagnosis of depression is difficult and often subjective. In young adults somatic or sexual complaints may obscure depression, while in the elderly depression may be confused with dementia or senility. False positive and false negative diagnoses are common. Some depressed patients are not formally diagnosed to protect them from the stigma of the label. Some patients are incorrectly diagnosed as depressed to avoid the stigma of a true diagnosis of psychosis. The diagnosis is frequently missed. The criteria used by individual clinicians in the diagnosis of depression during the

study period are not known, but probably do not differ from community standards.

Current data on the incidence and prevalence of depression vary from report to report, although the incidence does appear to have increased in the last two decades.[1] Over 95 percent of patients with depression recover. Without treatment, an episode of depression averages six months in duration.[2]

The treatment of depression in ambulatory settings is by psychotherapy, drugs, or both. If the illness is severe, hospitalization and in some settings electroconvulsive shock therapy (ECT) may be used. ECT was not used by Health Plan physicians during the study period. Drugs included minor and major tranquilizers, lithium, and more recently the antidepressants.[3] The appropriate form and efficacy of therapy in the treatment of depression is a matter of controversy.[4]

B. Episode Definition

Depression was identified by the ICDA, 7th edition code 324.5. All contacts with this updated diagnosis were included in the depression analysis file. For each person, the contacts for depression were sorted into chronological order. An episode began with a patient's first contact with an presenting morbidity of depression. The first contact of the episode

[1]Mitchell-Heggs N. Aspects of the natural history of depression. Proc Royal Soc Med 1971; 64:1171-1178.
[2]Klaman GL. Affective disorders. In Nicholi, AM, ed. Harvard Guide to Modern Psychiatry. Cambridge (Mass): Harvard University Press, 1978.
[3]Cole JO, ed. Depression. New York City: Plenum Publishers 1978.
[4]Weissman MM. The psycholgoical treatment of depression. Arch Gen Psychiat 1979; 36:1261-1269.

was further defined as initial (beginning a new episode), or as continuing (the episode was ongoing at the start of the data system, or there was information in the medical record indicating that the problem had previously existed). The episode ended with the patient's last contact for depression in the 1966-1973 period. Four hundred eighty-four episodes were identified by these criteria.

Three criteria were used to select confirmed episodes of depression from the original 484. Each contact was coded as having an established, tentative, or unknown diagnosis. The first criterion required that at least one contact in each episode have an established diagnosis of depression. Of the 484 original episodes, 10.7 percent failed to meet this criterion. The second criterion was that each episode should include at least two contacts. Of the 484 original episodes, 42 percent had only a single contact. Some of these single-contact episodes also failed to meet the first criterion. The third criterion was that patients should be at least sixteen years old at the index contact. Two hundred eighty-one episodes of depression met all the criteria and were selected for analysis.

II. DESCRIPTIVE ANALYSIS

A. Patient Characteristics

Seventy-six percent of depression episodes involved females. The distribution of episodes was relatively even across ages, with somewhat smaller proportions in the ages

under 24 or over 55 (Table 11-1). The mean age of all patients at the time of the first contact was 42 years (SE 1 year).

In only 6.4 percent of episodes was the patient ineligible for Health Plan coverage at one or more contacts. The average family size of persons with episodes of depression was 3.1 persons, and 20 percent of episodes involved a single person family (Table 11-2).

A comorbidity is any condition, other than depression, that was present and diagnosed at the time of any contact for depression. Comorbidities were examined because of their potential influence on the cost of treatment of depression. The most common comorbidity was anxiety, present in 17.4 percent of episodes (Table 11-3). Obesity, hypertension, and menopause were, in order, the next most common comorbidities. In 18.5 percent of episodes, a chronic or life threatening illness was present as a comorbidity (Table 11-4). Diagnosed mental illness other than depression was present at the first contact in 29 percent of episodes.

Mental or somatic symptoms were recorded in 28 percent of episodes (Table 11-5). Thirty-nine percent of episodes included at least one specific symptom or comorbidity diagnostic of depression.

In 89 percent of episodes, the diagnosis of depression was established at the first contact, but in only 40 percent of episodes was depression the primary reason (presenting mor-

bidity) for the initial contact (Table 11-6). Ninety percent of episodes were new, and 10 percent were continuing episodes.

B. Provider Characteristics

The patient was seen at the initial depression contact by an internist in 68 percent of episodes and by a mental health provider (psychiatrist, psychologist, or social worker) in 17 percent of episodes (Tables 11-7). In 83 percent of episodes, there was at least one internist contact (Table 11-8). Twenty-four percent of episodes included social worker contacts, while psychologist and obstetrician/gynecologist contacts were each present in 13 percent of episodes. Sixteen percent of episodes included psychiatrist contacts.

The most common pattern of care, in 56 percent of episodes was physician visits without other types of contacts (Table 11-9). Forty-one pecent of episodes included one or more mental health contacts. In most episodes with mental health contacts, physician contacts were also present.

Eighty-nine percent of episodes included at least one contact with a nonpsychiatrist physician; 52 percent had three or more (Table 11-10). Most contacts, 63 percent, were not with mental health providers. Twenty-four percent of episodes included three or more mental health provider contacts. Seven percent of episodes inlcuded other nonphysician contacts. In 22 percent of episodes, there was at least one contact with a consultant.

C. Medical Care Process Characteristics.

In 17 percent of episodes, there was less than 12 months effective membership in the Health Plan in the first year of the episode. This resulted from contacts occurring within the calendar year in which an individual joined the Health Plan, as well as those which occurred during the year in which the person left the Health Plan.

Ninety percent of episodes had one or more regularly scheduled medical office appointments (Table 11-11). Only 7 percent had emergency room contacts, although 23 percent of episodes had some outside regular medical office hours contacts and 39 percent had walk-in contacts. The average number of regularly scheduled medical office visits was 4.4 per episode.

In 53 percent of episodes, no instruction was given at the first contact that the patient should return for further care (Table 11-12). Since all episodes in this analysis included two or more contacts, the return in 53 percent of episodes resulted from self-referral. Of those patients instructed to return for care, 60 percent were to return to a physician and 29 percent were referred to mental health; 14 percent were referred to the laboratory or x-ray.

D. Resource Utilization

The mean cost per episode (exclusive of drug and hospital costs) was $43.71 (SE $5.60), with a maximum of $819.50 (Table 11-13). Sixty-three episodes (22 percent) had no costs charged to them. Office visit costs accounted for 84.7 percent of

total costs. In 68 percent of episodes, at least one office visit occurred with depression as the principal reason for the contact, causing the cost of the visit to be charged to the depression episode.

The number of depression episodes increased after 1971 (Table 11-14). Table 11-15 shows that duration of episodes ranged from two days to 2,597 days with a mean of 444 days (SE 34 days). Forty-nine percent of the episodes were less than six months in duration, while 51 percent had a duration of 181 days or more. Year of the index contact and episode duration had a sigificant inverse correlation ($r = -.53$, $p < .001$). The proportion of contacts that were with nonpsychiatrist nonphysicians varied inversely with the year of the index contact ($r = -.16$, $p = .01$), suggesting a shift over time toward use of mental health professionals and physician extenders in giving care for depression.

The number of contacts in the episode varied from two to 64, with a mean of 7.1 (Table 11-16). Twenty-eight percent of episodes had only two contacts, and 26 percent had eight or more contacts. Sixty episodes, 21.3 percent, began with routine physical examinations.

Only 13 percent of episodes had any laboratory procedures coded to them, and only 6 percent of episodes had three or more (Table 11-17). Only 4.3 percent of episodes had x-ray procedures charged to them.

Seventy-three percent of episodes of depression had one or more drug orders; the average number of drug orders was 2.3, with a maximum of 13 (Table 11-18). Among the episodes with drug orders, 25 percent had orders for minor tranquilizers, 32 percent had orders for major tranquilizers, and 71 percent had orders for antidepressant drugs.

Seven percent of episodes included one or more hospitalizations (Table 11-19). Further examination of inpatient and outpatient medical records would be necessary to determine whether depression was the primary reason for the hospitalization.

III. BIVARIATE ANALYSIS OF RESOURCE USE

This section examines each of the patient, provider and medical care process variables for their effects on: 1) whether resources were used in the episode, and 2) the extent of resource use for episodes with zero total dollar costs.

A. Patient Characteristics

In episodes with resource use, costs were significantly higher for those with one or more contacts at which the patient was ineligible for Health Plan benefits (Table 11-20).

When depression was the presenting morbidity at the initial contact, resources were always used, by definition. Among episodes with resource use, costs were significantly higher if depresion was the presenting morbidity at the index contact (Table 11-21).

Episodes with chronic or life-threatening comorbidities at the index contact, and those with mental illness other than depression as a commorbidity at the index contact, were significantly less likely to have costs charged to the episode of depression than were those without these comorbidities (Table 11-22). Among episodes with resource use, costs were significantly lower for those with chronic or life-threatening comorbidities, while the presence of other mental illness did not affect costs for care of depression.

Patient age, sex, family size, types of symptoms at the initial contact, and status of the diagnosis at the index contact had no significant effect on cost of depression episodes.

B. Provider Characteristics

Episodes with psychiatrist or social worker contacts were significantly more likely to have resource use than episodes without contacts with these provider specialties (Tables 11-23 and 11-24). Among episodes with resource use, costs were significantly greater for episodes with psychiatrist or social worker contacts. The presence of psychologist or consultant contacts did not affect the likelihood of an episode having dollar costs charged to it. However, among episodes with resource use, costs were significantly higher in those with psychologist or consultant contacts (Tables 11-25 and 11-26). The type of provider at the initial contact did not have a significant overall effect on the likelihood of resource use

in an episode (Table 11-27). Among episodes with resource use, costs were greatest in those beginning with psychologist or social worker contacts. The presence or absence of nonpsychiatrist physician contacts, or of nurse practitioner/physician assistant contacts, did not have a significant effect on resource use.

C. Medical Care Process Characteristics

Among episodes with resource use, mean total cost per episode increased significantly with episode duration, from $21.17 for episodes of 2-30 days to $99.76 for episodes of more than two years (Table 11-28). Costs were lower for episodes beginning in 1971 or later (Table 11-29). Given that episode costs increased with episode duration, and that episode duration and year of index contact had a strong inverse relationship, it seems probable that the effect of year on episode costs was due to truncation of ongoing episodes by the end of the study period.

Referral of the patient at the index contact to return for mental health follow-up care did not affect the likelihood of an episode having resource use (Table 11-30). However, among episodes with resource use, costs were significantly higher among those with such referrals.

Episodes with contacts outside of regular medical office hours were likely to have resource use, and among episodes with resource use, costs were significantly greater for episodes with out-of-hours contacts (Table 11-31).

Costs were not significantly affected by whether or not the patient was eligible for Health Plan coverage during the entire calendar year of the index contact, or whether the index contact was within regular medical office hours, or whether the patient was requested to return for care outside of the mental health clinic (i.e., laboratory, x-ray, or internist).

D. Utilization of Services

Episodes with drug orders were more likely to have resource use than were those without drug orders (Table 11-32). Among those with resource use, costs were higher for episodes with orders for major tranquilizers. Major contributions to episode cost variation were made by the number of medical office contacts ($ETA^2 = .84$), major tranquilizer orders ($ETA^2 = .34$), laboratory procedures ($ETA^2 = .25$), and telephone or letter contacts ($ETA^2 = .25$), as shown in Table 11-33. Where the numbers of a given service in an episode had a significant effect on costs, costs increased directly with the number of each type of service ordered.

The type of index contact (medical office appointment, walk-in medical office, telephone, letter, or emergency room) did not have a significant effect on episode costs. Likewise, the number of hospitalizations, minor tranquilizer orders, and antidepressant orders were not significantly related to episode costs. Episode costs did not include costs of inpatient procedures or bed-days, or the costs of drugs, but did include

outpatient office visits, laboratory, and x-ray costs. Therefore, it appears that use of hopsitalization, minor tranquilizers, and antidepressants was not strongly correlated with these outpatient procedures, while major tranquilizer use was correlated with these outaptient procedures.

IV. MULTIVARIATE ANALYSIS

A. Automatic Interaction Detection (AID)

This technique, described in Section IV, was used to identify the combinations of laboratory procedures, radiology procedures, mental health contacts, and physician contacts which best accounted for variation in episode costs. This procedure was also used to define the combinations of patient, provider, and medical care process characteristics which best accounted for the variation in costs of episodes of depression.

1. Utilization

The dependent variable was total outpatient cost per episode, excluding drug costs. The predictor variables used in the analysis are shown in Table 11-34, and results are shown in Figure 11-1. Overall, the predictor variables explained 57.1 percent of cost variation. The split between four or fewer and five or more mental health contacts explained 35.2 percent of total cost variation. An additional 21.9 percent of cost variation was explained by variation in the number of contacts with nonpsychiatrist physicians, and by a split between those receiving two or fewer mental health

contacts and those receiving three or four such contacts. Five bundles of care were defined. The lowest cost bundle of care, at a mean cost of $13.63 per episode (SE $1.45) included 188 episodes with six or fewer physician contact and two or fewer mental health contacts. The highest cost bundle of care, at a mean costs of $323.20 per episode (SE $55.67) included 15 episodes with five or more mental health contacts and five or more physician contacts. There was a wide range in cost of bundles of care for depression episodes.

2. Patient, Provider, and Medical Care Process Characteristics

This analysis used total outpatient dollar cost per episode (exclusive of drug costs) as the dependent variable and shows the influence of combinations of patient, provider, and medical care process characteristics on episode costs. Variables used are shown in Table 11-35, and analysis results are in Figure 11-2.

Patient, provider, and medical care process characteristics explained 30.9 percent of variation in episode costs. The costliest episodes were those with psychiatrist contacts; this explained 11.3 percent of cost variation. Costs were slightly lower for those without psychiatrist contacts and with psychologist contacts, and considerably lower for those with social worker contacts but without psychologist or psychiatrist contacts. The least expensive episodes were those without psychiatrist, psychologist, or social worker contacts;

among these, not surprisingly, lower costs were associated with those for whom depression was not the primary reason for the index contact. Among those with psychiatrist contacts, costs were higher for episodes beginning prior to 1971, probably because later episodes were truncated by the end of the study period. Of the variation in costs accounted for by this analysis, most was due to the type of provider contacted by the patient during the episode. However, there is no way to judge from these data whether 1) patients with more severe depression visited higher cost specialties, or 2) the higher costs of mental health providers was due to a propensity to order more intensive therapy because of their training and professional customs, rather than because the patient's condition called for intensive therapy.

To examine whether long and short episodes were associated with qualitatively different bundles of care or with different patient, provider, and medical care process predictors of cost, AID analyses were repeated for episodes lasting six or more months, and those lasting less than 180 days. The results, not shown in this report, indicated that long and short episodes were similar in bundles of care and in patient, provider, and medical care process predictors of cost.

Log-linear multiple classification analysis, which would relate choice of bundle of care to the interactions of the patient, provider, and medical care process variables, was not

done for this condition; the relationships between bundles of care defined by the number of mental health contacts and patient/provider/medical care process variables (principally the presence or absence of mental health specialty contacts-psychiatrists, psychologists, or social workers) would have been largely tautological.

B. Analysis of Bundles of Care

Episodes receiving the first, costliest bundle of care --five or more mental health contacts and five or more physician contacts--were more likely than others to have one or more laboratory tests, radiology procedures, or hospitalizations during episodes of depression (Table 11-36). Those receiving the fourth bundle of care--two or fewer mental health visits and seven or more physician visits--were next most likely to have one or more of these services. Emergency room contacts were most common among those receiving the costliest bundle of care. Those receiving the first and the fourth bundles of care were most likely to have walk-in medical office contacts or contacts outside normal office hours. [The first and fourth bundles of care had the largest number of all types of contacts (Table 11-37) and of nonpsychiatrist physician contacts (Table 11-42).] The index contact was least likely to be a physical examination among those receiving the second and third bundles of care--all of which had four or fewer physician contacts and three or more mental health contacts. The bundle of care had little association with whether the

patient had been instructed at the index contact to return for further care.

Total number of contacts, medical office contacts, drug orders, and episode duration were greatest among episodes receiving the costliest bundle of care, followed by those receiving the fourth bundle of care (Table 11-37). The episodes receiving the fifth, lowest-cost bundle of care (two or fewer mental health visits and six or fewer physician contacts) had the shortest episodes, the fewest contacts, and the fewest drug orders. The mean number of drug orders appeared to increase directly with the number of contacts. However, costs did not increase directly with the number of contacts in the bundles. The proportion of total contacts that were medical office contacts or telephone/letter contacts was similar across all bundles of care.

All episodes receivng the first, third, and fourth bundles of care in 1972 or 1973 had drug orders (Table 11-38). The proportion of episodes receiving drug orders was lowest for those receiving the second bundle of care. All episodes receiving the first and fourth bundles of care had at least three drug orders; roughly one-quarter of other episodes had three or more drug orders. The proportion of episodes receiving minor tranquilizers, major tranquilizers, and antidepressants did not vary directly with episode costs. Roughly one-fifth of those receiving the lowest cost bundle of care had a major or minor tranquilizer order, and 51 percent had antidepressant drugs ordered.

Depression was most likely to have been the primary reason for the index contact in episodes receiving the second and third bundles of care, and least likely to have been the presenting morbidity in episodes receiving the fourth and fifth bundles of care (Table 11-39). Episodes receiving the fourth and fifth bundles of care were more likely to have chronic or life-threatening illness as an index contact comorbidity than were episodes receiving the higher cost bundles of care. The proportion of episodes with mental illness other than depression as a comorbidity at the index contact did not vary directly with bundle cost. Episodes receiving the lowest cost bundle of care were most likely to have comorbidities at the index contact. Patient sex, age, and index contact symptoms did not vary significantly by the bundle of care.

The proportion of episodes with consultant, psychiatrist, psychologist, or social worker contacts was greatest for those receiving the first bundle of care (Table 11-40). Those receiving the second and third bundles of care had lower probabilities of having such contacts; mental health specialty contacts were least likely for those receiving the fourth and fifth bundles of care. The majority of episodes receiving any bundle of care had at least one contact with a nonpsychiatist physician. Episodes receiving the costliest bundle of care and those receiving the two lowest-cost bundles of care were more likely than others to begin with a non-psychiatrist physician contact (Table 11-41). Episodes receiving the second

and third bundles of care were more likely than others to begin with a psychiatrist, psychologist, or social worker contact. The number of contacts with nonpsychiatrist physicians was greatest for episodes receiving the first and fourth bundles of care, and the number of mental health contacts increased with higher bundle costs (Table 11-42). The proportion of physician contacts was greatest for episodes receiving the two lowest-cost bundles of care, while the proportion of mental health contacts was greatest for those receiving the second and third bundles of care.

V. SUMMARY AND CONCLUSION

A. Episode Definition

Depression was analyzed in this report as a chronic, condition. For each patient, all Health Plan contacts with depression as a presenting or associated morbidity were arranged in chronological order; these constituted an episode of care. Recurrences were not defined or examined. All episodes were required to have two or more contacts, and the depression diagnosis was to be coded as established in at least one of these. Only patients 16 years of age or over were included.

The data did not allow episodes of depression to be differentiated by the type of illness (i.e., endogenous or exogenous) or by the severity of illness. Symptom type, severity, and duration at the intial contact were often unavailable; when coded, this information was of unknown validity. The 281 episodes combined those for whom depression was the primary

reason for the index contact with those for whom depression was a secondary reason for the contact. Reliable stratification of depression episodes by severity would probably require a prospective study specifically designed to gather more thorough clinical information.

Criteria used by clinicians in diagnosis of depression during the study period are unknown, and may have changed over time. Current diagnostic criteria are established by the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, 3rd edition (DSM-III). These criteria hold that a patient must have at least four of the following symptoms to be diagnosed as depressed: appetite or weight change, change in sleep, fatigue, psychomotor agitation or retardation, decreased sexuality, feelings of guilt, anxiety or decreased ability to think, and suicidal ideas or attempts. A future prospective study could use these criteria as a more objective basis for confirming a diagnosis of depression and as an aid in stratifying episodes by severity of illness.

B. Principal Descriptive Findings

The mean patient age at the index contact was 42 years, and 76 percent of patients were female. Chronic or life-threatening illness was present as a comorbidity in 18.5 percent of episodes, and 29 percent had mental illness other than depression as a comorbidity--usually, anxiety or psychophysiologic reactions. Obesity and hypertension were the most

common organic comorbidities. The depression diagnosis was established at the index contact in 89 percent of episodes, but only 40 percent had depression noted as the primary reason for the initial contact.

The index contact provider was an internist in 68 percent of episodes and a mental health provider (psychologist, psychiatrist, or social worker) in 17 percent of episodes. At least one mental health contact was present in 41 percent of episodes, and 24 percent had three or more such contacts. Usually, episodes with mental health contacts also included nonpsychiatrist physician contacts. Nonpsychiatrist physicians were the only specialty type contacted in 56 percent of episodes.

The mean number of contacts per episode was 7.1, with a maximum of 64. Twenty-eight percent of episodes had two contacts, while 26 percent had eight or more contacts. Seven percent of episodes included hospitalization for depression or for coexisting illness, and 7 percent included an emergency room contact. Walk-in contacts occurred in 39 percent of episodes. In 53 percent of episodes, the second contact occurred on the patient's own initiative, without having received instructions at the index contact to return for further care. The mean episode duration was 444 days. The year of the index contact was inversely related to episode duration, suggesting truncation of episodes by the end of the study period. The year of the index contact was also inversely correlated with

the proportion of contacts that were with nonpsychiatrist physicians, suggesting a trend in the 1970s toward more use of physician extenders and mental health specialists in giving care for depression. Laboratory or radiology procedures were done in 14 percent of depression episodes. The mean cost per episode was $43.71, with a maximum of $819.50. Office visit costs accounted for 84.7 percent of outpatient, nondrug costs. Twenty-two percent of episodes had no costs charged to them; all office visits and procedures were charged to a comorbidity.

Drug orders were given in 73 percent of depression episodes beginning in 1972 or 1973; the mean number of drug orders per episode was 2.3, with a maximum of 13. Among those with drug orders, 25 percent had minor tranquilizer orders, 32 percent had major tranquilizers, and 71 had anti-depressants.

C. Bundles of Care

Outpatient dollar cost, exclusive of drug costs, was the measure of resource use for this condition. Five bundles of care were defined using AID analysis; the choice among them explained 57.1 percent of all variation in episode costs. The range of cost of bundles of care was 24-fold, from $13.63 for the 188 episodes receiving two or fewer mental health contacts and six or fewer physician contacts, to $323.20 for the 15 episodes receiving five or more mental health contacts and five or more physician contacts. Most cost variation was explained by variation in the number of mental health contacts.

The different bundles of care represented qualitatively and quantitatively different patterns of care for depression. The number of mental health contacts increased directly with bundle cost. The number of drug orders, however, varied with the number of nonpsychiatrist physician contacts--and both were large in the fourth bundle of care (two or fewer mental health contacts and seven or more physician contacts) as well as in the costliest bundle of care. The second and third bundles of care were costlier than the fourth bundle of care; they had more mental health contacts, but fewer drug orders and fewer physician contacts. Thus, there appeared to be a tradeoff between the two most common modalities for outpatient treatment of depression: drug therapy and psychotherapy, along with a tradeoff between care given by mental health professionals as opposed to internists and other non-psychiatrist physician contacts--and both were large in the fourth bundle of care (two or fewer mental health contacts and seven or more physician contacts) as well as in the costliest bundle of care. The second and third bundles of care were costlier than the fourth bundle of care; they had more mental health contacts, but fewer drug orders and fewer physician contacts. Thus, there appeared to be a tradeoff between the two most common modalities for outpatient treatment of depression--drug therapy and psychotherapy--along with a tradeoff between care given by mental health professionals as opposed to internists and other non-psychiatrist physicians.

The proportion of contacts which occurred in the medical office was similar for all bundles of care.

D. Influence of Patient, Provider, and Medical Care Process Characteristics on Resource Use

Episodes in which depression was the primary reason for the index contact had higher costs; this was probably a proxy for severity of the illness. Episodes with life-threatening, chronic, or nondepression mental illness comorbidities had lower costs, probably because office visits were charged to a comorbidity. Medical care resource use due to depression might have been charged to another illness if hypochondria or attention-getting behaviors were part of the depression. Episodes which began in 1971 or later were associated with lower costs, probably due to truncation of ongoing episodes by the end of the study period. Longer episodes were associated with higher costs. Costs were higher for those with psychiatrist, psychologist, social worker, or consultant contacts. The data did not allow conclusions to be drawn as to whether this effect was due to illness severity or due to a propensity (caused by specialized training) of mental health professionals to treat illness of a given severity with more office visits. These analyses overstated the effect of mental health care on total cost of depression treatment, since costs for hospitalization and drug therapy--associated with physician contacts rather than mental health contacts--were not included in the overall cost measure. Patient, age, sex,

symptoms, and initial provider type did not affect costs. Use of major transquilizers (but not antidepressants or minor tranquilizers) was associated with higher costs, primarily due to greater office visits costs. Because of the small sample size, differences in costs associated with individual providers were not examined.

Attachment A

Utilization Measures

1. No. of Hospital Admissions in Episode
   (0, 1 or more)

2. No. of Physician Contacts in Episode
   (1, 2, 3, 4, 5 or more)

3. No. of DOVs (Initial and Followup) in Episode
   (0, 1, 2, 3 or more)

4. No. of Telephone and/or Letter Contacts in Episode
   (0, 1, 2 or more)

5. No. of Symptom-Related Telephone Contacts in Episode
   (0, 1 or more)

6. No. of Radiology Procedures in Episode
   (0, 1 or more)

7. No. of Laboratory Procedures in Episode
   (0, 1, 2, 3-5, 6 or more)

8. No. of Cultures in Episode
   (0, 1, 2 or more)

9. No. of Blood Counts in Episode
   (0, 1, 2, 3 or more)

10. No. of Urinalysis in Episode
    (0, 1 or more)

11. Episode with Culture, Blood Count and Urinalysis in Episode
    (Yes, No)

12. No. of Connective Tissue Disease Test in Episode
    (0, 1 or more)

13. No. of Drug Orders in Episode (1972 and 1973)
    (0, 1, 2 or more)

Attachment B

Patient, Physician and Medical Care Process Variables

1. Sex of Member

2. Age at Time of First Contact for FUO
(Under 5 years of age, 5-19, 20 and over)

3. Presenting Symptom
(Fever, Other than fever, or no presenting symptom)

4. Length of Presenting Symptom
(No symptoms reported, one day, longer than one day or no length reported)

5. Status of Diagnosis at First Contact
(Established, Tentative, Unknown)

6. Contacts with Comorbidities
(None, 1, 2 or more)

7. Physician Specialty at First Contact
(Pediatrics, Internal Medicine, Other)

8. Place of Service for First Contact
(Medical Office, Emergency Room, Telephone-Letter, Hospital)

9. Type of Appointment
(Walk-in, Other than Walk-in)

10. Time of Appointment
(During Medical Office Hours, Not During Medical Office Hours)

11. Return Visit Scheduled at First Contact
(Yes, No)

12. Year of First Contact
(1966, 67 and 68, 1969, 1970, 1971, 1972, 1973)

13. Duration of Episode
(One Contact, One Day, 2-5 Days, 6 Days or Longer)

TABLE 11-1

Episodes of Depression by Age as of Date of First Contact

Age	N	Pct.
16-24	44	16
25-34	61	22
35-44	49	17
45-54	56	20
55-64	40	14
65-86	31	11
Total	281	100

TABLE 11-2

Episodes of Depression by Size of Family as of Date of Service

Size of Family	N	Pct.
1	55	20
2	66	24
3	52	19
4	49	17
≥5	59	21
	281	100
Mean family unit size	3.1 persons	

TABLE 11-3

The Most Common Comorbidities Present at the Index Contact of Depression Episodes

ICDA Code	Name	N	Pct.
3240	Anxiety	49	17
2870	Obesity	21	7
4470	Hypertension	14	5
6350	Menopause	13	5
3235	Psychophysiologic gastrointestinal reaction	8	3

TABLE 11-4
COMORBIDITIES

Episodes of Depression with Chronic or Life Threatening Illness as Comorbidities* at the Index Contact

Chronic Disease is Present	N	Pct.
No	229	82
Yes	52	18
	281	100

* Defined as ICDA codes 1380, 1538-1990, 2313, 2520, 2531, 2538, 2600, 2869, 3509, 3522, 3531, 3532, 3555, 3661, 4200-4333, 4335-4349, 4470, 4569, 5020, 5271, 5410, 5709, 5840, 6000, 6260, 6480, 7220, 7352, 7571, 8520 - Sarcoid of Boeck, cancer, goiter, hypothyroidim, diabetes, nutritional deficiency, paralysis agitans, paraplegia, epilepsy, chorea, narcolepsy, spinal neuralgia, heart disease, hypertension, artery disease, emphysema, stomach ulcer, intestinal obstruction, cholelithiasis, pyelonephritis, pelvic inflammatory disease, threatened abortion, rheumatoid arthritis, post fusion back pain, polycystic kidney disease, concussion.

Mental Illness Other than Depression Present as a Comorbidity at the Index Contact*

Other Mental Illness is Present	N	Pct.
No	199	71
Yes	82	29
	281	100

*Includes ICDA Codes 3231-3240, 3243, 3247, 3249-3269, 3278, Y092, T099, T149: psychophysiologic disease, phobia, anxiety, compulsiveness, other neuroses, schizophrenia, social problems, excessive drinking.

TABLE 11-5

Frequency of Symptoms in Episodes of Depression

Index Contact Symptoms	N	Pct.
None	201	72
Depression	27	10
Other mental symptoms	17	6
Somatic symptoms	23	8
Depression, other mental symptoms	6	2
Depression, somatic symptoms	2	1
Somatic symptoms with other (non-depression) mental symptoms)	5	2
	281	100

Comorbidities and Symptoms Diagnostic of Depression, At One or More Contacts	N	Pct.
Not present in episode	171	61
Present in episode	110	39
	281	100

Including:*	N	Pct.
Appetite or weight change	4	1
Change in sleep	8	3
Fatigue	17	6
Psychomotor agitation or retardation	0	0
Decreased sexuality	0	0
Feelings of guilt	6	2
Anxiety; decreased ability to think	87	31
Suicidal ideas or attempts	0	0

*These are the eight cardinal symptoms of depression, as defined by the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM - III, published by the American Psychiatric Association in Washington DC in 1978. These add up to more than 110, since some patients had multiple symptoms.

TABLE 11-6

Episodes of Depression by Status of Diagnosis at Initial Contact

Diagnosis Status	N	Pct.
Presenting morbidity	113	40
Associated morbidity	168	60
	281	100
Certainty of Depression Diagnosis	**N**	**Pct.**
Unknown	13	5
Tentative	17	6
Established	251	89
	281	100

TABLE 11-7

Provider Specialty at the Index Contact for Depression Episodes

Type	N	Pct.
Internal Medicine	191	68
Obstetrician-gynecologist	22	8
Psychiatrist	13	5
Psychologist	13	5
Social Worker	21	7
Surgery, Emergency Surgery	9	3
NHP	5	2
Other	7	2
	281	100

TABLE 11-8

Percent of Depression Episodes with One or More Contacts With Various Provider Specialties

Type	N	Pct.	Maximum Number of Contacts
Internist	234	83	59
Ob-Gyn	36	13	19
Orthopedics	6	2	4
Pediatrics	2	1	4
Surgeon	13	5	3
Urology	2	1	1
NHP	12	4	6
Emergency Surgery	6	2	1
Psychiatrists	45	16	44
Psychologists	36	13	41
Social Workers	68	24	25

TABLE 11-9

Combinations of Provider Types
Contacted During Depression Episodes

Combinations	N	Pct.
Physician only*	158	56
Mental Health only**	25	9
Other Providers only***	4	1
Physician, Mental Health	77	27
Mental Health, Other Provider	2	1
Physician, Other Provider	5	2
Physician, Mental Health, & Other Provider	10	4
	281	100

*All physicians except psychiatrists
**Psychiatrists, psychologists, social workers
***Nurses, physician assistants, etc.

TABLE 11-10

Frequency of Contacts by Provider Type
in Episodes of Depression

Provider Type	Percent of Episodes with Given Number of Contacts				Mean Number of Contacts	S.E.	Maximum
	0	1	2	3 or more			
Physician*	11	8	29	52	4.3	0.4	59
Mental Health**	59.4	6.4	10.3	23.8	2.6	0.4	53
Other***	93	3	2	2	0.2	0.04	6

*Except for psychiatrists
**Psychiatrists, psychologists, and social workers
***Nurses, physician assistants, etc.

TABLE 11-11

Frequency of Appointment Types in Episodes of Depression

Type	Percent of Episodes With Given Number of Contacts 0	1	2	3 or more	Mean	S.E.
Regularly Scheduled Medical Office	10	16	26	48	4.4	0.4
Out of Hours	77	12	6	5	0.6	0.1
Walk-in Medical Office	61	25	9	5	0.6	0.1
Emergency Room	93	6	1	0	0.1	0.02
Phone or Letter	47	23	14	16	1.5	0.2

TABLE 11-12

First Contact Instructions to Return for Further Care In Episodes of Depression

Type of Return	N	Pct.
No instruction to return for further care	148	53
Any return instruction	133	47
	281	100
Including:*		
Return to physician**	80	29
Return to laboratory or x-ray***	19	7
Return to mental health	39	14
Other return instructions	8	3

*These add up to more than 133, since some patients were given more than one instruction to return.
**Includes 8 who were instructed to return to a consultant.
***16 instructed to return for laboratory tests, and 6 instructed to return to radiology. Some patients were asked to return to both.

TABLE 11-13

Costs of Resource Utilization in Episodes of Depression

Type of Service	Mean Dollar Cost	S.E.	Maximum Cost Per Episode	Mean Dollar Cost as a Percentage of Total Cost	Episodes with Non-Zero Costs in this Category N	Pct.
Laboratory and X-ray	$2.99	$0.65	$94.20	6.8	39	14
Office visits	37.01	5.14	815	84.7	191	68
Letters	0.36	0.11	26	0.8	24	9
Telephone calls	1.58	0.23	46.50	3.6	116	41
Other office procedures	1.77	0.80	180	4.0	11	4
All costs	43.71	5.60	819.50	100	218	78

TABLE 11-14

Frequency of Depression Episodes by Year of Index Contact

Year	N	Pct.	New Episodes per 1000 Persons with Study I eligibility in the given year*
1966	11	4	---
1967	32	11	5.5
1968	20	7	2.9
1969	39	14	5.0
1970	32	11	3.8
1971	47	17	5.2
1972	48	17	4.7
1973	52	19	4.8
	281	100	---

*Rate is based on all perseons with one or more months of eligibility in the given year.

TABLE 11-15

Episodes of Depression by Duration

Duration	N	Pct.
2-30 days	54	19
31-90 days	54	19
91-180 days	32	11
181-364 days	39	14
365-729 days	38	14
2+ years	64	23
	281	100

$\bar{X}$ = 444, SE = 35, Range = 2-2597

TABLE 11-16

Total Number of Contacts in Episodes of Depression

Number of Contacts	N	Pct.
2	80	28
3	42	15
4	33	12
5	24	9
6	16	6
7	14	5
8	10	4
9-14	34	12
15-25	19	7
> 25	9	3
	281	100

$\bar{X}$ = 7.1 contacts/episode, SE = 0.5, Range = 2-64 contacts

TABLE 11-17

The Frequency Distribution of Laboratory and X-ray Utilization in Episodes of Depression

Number of Lab Tests	N	Pct.
	Laboratory	
None	245	87
1	11	4
2	7	3
3 or more	18	6
	281	100
	X-ray	
None	269	96
1-2	12	4
	281	100

TABLE 11-18

The Frequency of Drugs Ordered in Depression Episodes*

Type of Drug Ordered	Percent of Episodes Receiving the Given Number of Drug Orders 0	1	2	3 or more	Mean	S.E.
All drugs	27	19	23	31	2.3	.3
Minor tranquilizers	82	10	5	3	0.3	.1
Major tranquilizers	77	9	5	9	0.7	.2
Antidepressants	48	26	14	12	1.1	.2

*Based on 100 episodes that began in 1972 or 1973, the only years for which drug data was available.

TABLE 11-19

Frequency of Hospital Admissions in Episodes of Depression

Number of Hospital Admissions	N	Pct.
None	260	93
1	20	7
2	1	--
	281	100

TABLE 11-20

Resource Use for Depression Episodes
by Eligibility for Health Plan Benefits

Resource Use	Eligible at All Contacts (Pct.)	Ineligible at One or More Contacts (Pct.)	Total (Pct.)
No	22	22	22
Yes	78	78	78
Total	100	100	100
	(n=263)	(n=18)	(n=281)

$X^2=0.000$, $p=1.0$

For episodes with resource use:

Mean Resource Use and Eligibility

	Eligible at All Contacts	Ineligible at One or More Contacts	Overall Mean
Total cost per episode	$52.54	$111.63	$56.33

$F=4.4$, $p=0.04$, $ETA^2=0.02$

TABLE 11-21

Resource Use For Episodes With Depression as the Presenting or Associated Morbidity at the First Contact

Resource Use	Depression Presenting Morbidity (Pct.)	Depression Associated Morbidity (Pct.	Total (Pct.)
No	0*	38	22
Yes	100	62	78
Total	100	100	100
	(n=113)	(n=168)	(n=281)

* Empty cell, X2 not calculated.

For episodes with resource use:

Mean Resource Use in Dollars and Depression Status at First Visit

	Depression Presenting Morbidity at Index Contact	Depression Associated Morbidity at Index Contact	Overall Mean
Total cost per episode	$70.73	$40.85	$56.33

F=4.6, p=0.03, ETA2=0.02

TABLE 11-22

Resource Use for Depression Episodes by the Presence or Absence of Non-depression Mental Illness or a Chronic or Life-threatening Comorbidity at the Index Contact*

	No Chronic Illness (Pct.)	Chronic Illness (Pct.)	Total (Pct.)
No Resource Use	18	40	22
Resource Use	82	60	78
Total	100	100	100

$X^2=10.6$, $p=.001$

	No Mental Illness Other than Depression (Pct.)	Mental Illness Other than Depression (Pct.)	Total (Pct.)
No Resource Use	18	33	22
Resource Use	82	67	78
Total	100	100	100

$X^2=6.5$, $p=.01$

For episodes with resource use:

Resource Use in Dollars for Depression Episodes by Presence of a Chronic or Life-threatening Illness at the Index Contact

Mean Resource Use	No Chronic Illness	Chronic Illness	Overall Mean
Total Cost per episode	$61.17	$27.12	$56.33

$F=2.9$, $p=.09$, $ETA^2=.01$

Resource Use in Dollars for Depression Episodes by Presence of Mental Illness Other Than Depression as a Comorbidity at the Index Contact

Mean Resource Use	No Mental Illness	Mental Illness	Overall Mean
Total Cost per episode	$55.22	$59.62	$56.33

$F=0.1$, $p=.78$, $ETA^2=.0$

*Mental illness and chronic/life-threatening comorbidities include conditions noted in Table 8-4.

TABLE 11-23

Resource Use for Depression Episodes by the Presence or Absence of Contacts With a Psychiatrist

Resource Use	No Psychiatrist Contacts (Pct.)	One or More Psychiatrist Contacts (Pct.)	Total (Pct.)
No	26	4	22
Yes	74	96	78
Total	100 (n=236)	100 (n=45)	100 (n=281)

$X^2=8.8$, $p=.0031$

For episodes with resource use:

Mean Resource Use in Dollars for Depression Episodes by the Presence or Absence of Psychiatrist Contacts

	No Psychiatrist Contacts	Psychiatrist Contacts	Overall Mean
Total Cost per episode	$40.43	$121.07	$56.33

$F=23.3$, $p<.0001$, $ETA2=.10$

TABLE 11-24

Resource Use for Depression Episodes by the Presence or Absence of Contacts With a Social Worker

Resource Use	No Social Worker Contacts (Pct.)	One or more Social Worker Contacts (Pct.)	Total (Pct.)
No	26	12	22
Yes	74	88	78
Total	100 (n=213)	100 (n=68)	100 (n=281)

$X^2=5.1$, $p=.02$

For episodes with resource use:

Mean Resource Use in Dollars for Depression Episodes by the Presence or Absence of Social Worker Contacts

	No Social Worker Contacts	Social Worker Contacts	Overall Mean
Total Cost per episode	$35.61	$110.92	$56.33

$F=25.8$, $p<=.0001$, $ETA2=.11$

TABLE 11-25

Resource Use for Depression Episodes by the Presence or Absence of Contacts With a Psychologist

Resource Use	No Psychologist Contacts (Pct.)	One or More Psychologist Contacts (Pct.)	Total (Pct.)
No	24	11	22
Yes	76	89	78
Total	100 (n=245)	100 (n=36)	100 (n=281)

$X^2=2.3$, $p=.13$

For episodes with resource use:

Mean Resource Use in Dollars for Depression Episodes by the Presence or Absence of Psychologist Contacts

	No Psychologist Contacts	Psychologist Contacts	Overall Mean
Total Cost per episode	$43.65	$130.07	$56.33

$F=20.9$, $p<=.0001$, $ETA2=.09$

TABLE 11-26

Resource Use for Depression Episodes by the Presence or Absence of Consultant Contacts

Resource Use	No Consultant Contacts (Pct.)	One or More Consultant Contacts (Pct.)	Total (Pct.)
No	25	13	22
Yes	75	87	78
Total	100 (n=220)	100 (n=61)	100 (n=281)

$X^2=3.2$, $p=.07$

For episodes with resource use:

Mean Resource Use in Dollars for Depression Episodes by the Presence or Absence of Consultant Contacts

	No Consultant Contacts	Consultant Contacts	Overall Mean
Total Cost per episode	$38.18	$112.84	$56.33

$F=23.1$, $p\leq.0001$, $ETA^2=.10$

TABLE 11-27

Resource Use for Depression Episodes by the Type of Providers at the Initial Contact

Resource Use	Physician other than Psychiatrist (Pct.)	Psychiatrist (Pct.)	Psychologist (Pct.)	Social Worker (Pct.)	Other* (Pct.)	Total (Pct.)
No	24	8	23	23	11	22
Yes	76	92	77	76	89	78
Total	100	100	100	100	100	100
	(n=225)	(n=13)	(n=13)	(n=21)	(n=9)	(n=281)

$X^2=2.5$, p=.64

. For episodes with resource use:

Mean Resource Use in Dollars for Depression Episodes by the Type of Provider at the Initial Contact

	Physician	Psychiatrist	Psychologist	Social Worker	Other*	Overall Mean
Total cost per episode	$44.48	$49.55	$145.85	$139.78	$42.43	$56.33

$F=5.5$, p=.0003, $ETA^2=.09$

*Primarily nurses and physician assistants

TABLE 11-28

Resource Use for Depression Episodes by Duration of the Episode

Percent of Episodes with this Duration Using Resources

Resource Use	2-30 days	31-90 days	91-180 days	181-364 days	365-729 days	2+ years	All
No	32	26	28	26	18	9	22
Yes	68	74	72	74	82	91	78
Total	100 (n=54)	100 (n=54)	100 (n=32)	100 (n=39)	100 (n=38)	100 (n=64)	100 (n=281)

X^2=10.4, p=.07, cc=.18, gamma=.29

For episodes with resource use:

Mean Resource Use in Dollars For Depression Episodes by Duration of Episode

	2-30 days	31-90 days	91-180 days	181-364 days	365-729 days	2+years	All
Total cost per episode	$21.17	$30.82	$34.78	$62.36	$60.31	$99.76	$56.33

F=3.9. p=0.002, ETA^2=0.08

TABLE 11-29

Resource Use for Depression Episodes by Year of Initial Contact

Resource Use	1966 (Pct.)	1967 (Pct.)	1968 (Pct.)	1969 (Pct.)	1970 (Pct.)	1971 (Pct.)	1972 (Pct.)	1973 (Pct.)	Total (Pct.)
No	0*	18.8	15.0	28.2	28.1	27.7	20.8	21.2	22
Yes	100	81.3	85.0	71.8	71.9	72.3	79.2	78.8	78
Total	100 (n=11)	100 (n=32)	100 (n=20)	100 (n=39)	100 (n=32)	100 (n=47)	100 (n=48)	100 (n=52)	100 (n=281)

*Empty cell; X^2 not calculated

For episodes with resource use:

Mean Dollar Cost for Depression Episodes by Year of Initial Contact

Year	Mean Cost	SE	n
1966	$ 85.36	$34.04	11
1967	103.56	37.79	26
1968	79.78	25.00	17
1969	61.72	20.99	28
1970	80.73	30.24	23
1971	43.08	7.60	34
1972	27.85	5.07	38
1973	28.88	4.21	41
	56.33	6.85	218

$F=2.2$, $p=.03$, $ETA^2=0.07$

TABLE 11-30

Resource Use for Depression Episodes by Index Contact Referral of Patient to Mental Health Follow-up Care

Resource Use	Mental Health Referral (Pct.)	No Mental Health Referral (Pct).	Total (Pct.)
No	23	18	22
Yes	77	82	78
Total	100 (n=242)	100 (n=39)	100 (n=281)

$X^2 = .3$, $p = .61$.

For episodes with resource Use:

Mean Cost in Dollars for Depression Episodes by Use of Mental Health Referral at the Index Contact

Mental Health Referral	Mean Cost	SE	n
Yes	$99.25	$32.09	32
No	$48.95	$5.95	186
	$56.33	$6.85	218

$F = 6.7$, $ETA^2 = .03$.

TABLE 11-31

Resource Use for Depression Episodes by the Presence or Absence of Contacts Outside Regular Medical Office Hours

Resource Use	All Contacts Within Medical Office Hours (Pct.)	One or More Contacts Outside Medical Hours (Pct.)	Total (Pct.)
No	26	9	22
Yes	74	91	78
	100 (n=216)	100 (n=65)	100 (n=281)

$X^2=7.5$; p=.006

For episodes with resource use:

Mean Cost in Dollars for Depression Episodes by the Presence of Contacts Outside Regular Medical Office Hours

	Mean Cost
All contacts regular hours	$47.81
Some contacts out-of-hours	$79.32

F=4.1; p=.04; $ETA^2=.02$

TABLE 11-32

Resource Use for Depression Episodes by Combinations of Drugs Ordered in Episodes Beginning 1972-73

Resource Use	No Drugs (Pct.)	Drugs but No Major Tranquilizers (Pct.)	Major Tranquilizers (Pct.)	Total (Pct.)
No	41	16	9	22
Yes	53	84	91	78
	100 (n=27)	100 (n=50)	100 (n=23)	100 (n=100)

$X^2 = 9.2$, $p = .01$

For Episodes with resource use:

Mean Resource Use in Dollars for Depression Episodes by the Combination of Drugs Ordered

Drugs Used	Mean	SE	N
No drugs	$26.09	$7.12	16
Drugs but no major tranquilizers	20.57	3.07	42
Major tranquilizers	45.78	8.13	21
All 1972-1973	28.39	3.06	79

$F = 6.1$, $p = .004$, $ETA^2 = 0.14$

TABLE 11-33

Extent of Relationships Between Mean Costs per Depression Episode and Selected Utilization Measures

Procedure or Service	F	P	ETA^2	Linearity
Hospitalizations*	0.4	.69	--	--
Medical office contacts*	47.7	<.0001	.84	Linear and nonlinear
Emergency room contacts*	3.9	.009	.04	Linear
Telephone or letter contacts*	7.3	<.0001	.25	Linear and nonlinear
Contacts outside regular medical office hours*	6.9	<.0001	.20	Linear and nonlinear
Walk-in medical office contacts*	2.8	.01	.06	Linear
Laboratory procedures*	7.4	<.0001	.25	Linear and nonlinear
Radiology procedures*	7.1	.0009	.05	Linear
Drugs ordered (all types)**	2.0	.03	.21	Linear
Minor tranquilizer orders**	0.2	.94	--	--
Major tranquilizer orders**	5.9	<.0001	.34	Linear and nonlinear
Antidepressants ordered**	1.8	.08	--	--

* Based on all 281 depression episodes.
**Based on 100 depression episodes beginning in 1972 or 1973.

TABLE 11-34

Predictor Variales Used in the AID Analysis of Utilization in Depression Episodes

1. Physician contacts (0, 1, 2, 3, 4, 5, 6, 7-59)
2. Mental health contacts (0 1, 2, 3, 4, 5-51)
3. Lab tests (0, 1-17)
4. X-ray procedures (0, 1-2)

TABLE 11-35

Patient, Provider and Medical Care Process Variables
Used in the AID Analysis of Episodes of Depression

1. Year (1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973)
2. Sex (male, female)
3. Age (16-24, 25-34, 35-44, 45-54, 55-64, 65+)
4. Size of family (1, 2 3, 4, 5+)
5. Was the patient eligible for Health Plan coverage at every contact? (Yes/No)
6. Was the first visit a new episode? (Yes/No)
7. Was depression the presenting morbidity at index contact? (Yes/No)
8. Was the diagnosis of depression established at index contact? (Yes/No)
9. Was a return to Mental Health ordered at the index contact? (Yes/No)
10. Combination of symptoms during the episode (none, anxiety only, other mental only, anxiety and other mental)
11. Was a chronic or life threatening illness present? (Yes/No)
12. Were mental symptoms other than depression present at index contact (Yes/No)
13. Symptom mix at index contact (none, depression, other mental, somatic, depression and other mental, depression and somatic, other mental and somatic)
14. Any out of hours contacts in episode? (Yes/No)
15. Any contacts with a temporary attending provider? (Yes/No)
16. Any contacts with consulting physician? (Yes/No)
17. Any regularly scheduled medical office contacts? (Yes/No)
18. Any walk-in medical office contacts? (Yes/No)
19. Type of provider at initial contact (non-psychiatrist physician, psychiatrist, psychologist, social worker, other)
20. Was the index contact with a physician? (Yes/No)
21. Was a non-psychiatrist physician contact present in episode? (Yes/No)
22. Was a psychiatrist contact present in episode? (Yes/No)
23. Was a psychologist contact present in episode? (Yes/No)
24. Was a social worker contact present in episode? (Yes/No)
25. Was a nurse or NHP contact present in episode? (Yes/No)
26. Type of appointment at index contact (regularly scheduled medical office, walk-in medical office, hospital emergency room, telephone, letter, other)

TABLE II-36

Utilization of Selected Services among Depression Episodes Receiving Five Different Bundles of Care

	N	1+ Laboratory Tests	1+ Radiology Procedures	1+ Hospitalization	1+ Emergency Room Contacts	1+ Walk-in Medical Office Visit	1+ Contacts Outside Regular Office Hours	Index Contact was a Physical Examination	Patient Instructed to Return for Further Care at Index Contact
1. 5+ Mental Health Contacts and 5+ Physician Contacts	15	47	20	20	27	73	47	27	60
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	24	8	4	0	4	17	25	4	58
3. 3-4 Mental Health Contacts	18	6	6	0	11	17	28	6	44
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	36	14	8	17	8	64	44	25	47
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	188	11	2	6	6	37	17	24	45
Total	281	13%	4%	8%	8%	40%	23%	21%	47%

TABLE 11-37

Mean Utilization Characteristics of Depression Episodes Receiving Five Different Bundles of Care

Bundle	Bundle N		Cost		Duration (Years)		All Contacts		Medical Office Contacts		Drug Orders	
	All	1972-73	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
1. 5+ Mental Health Contacts and 5+ Physician Contacts	15	1	$323.44	$57.65	3.4	0.5	31.1	4.5	22.6	4.0	13	0
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	24	11	93.76	17.84	1.3	0.2	10.8	1.3	9.1	1.3	2.3	1.1
3. 3-4 Mental Health Contacts	18	5	62.21	11.03	1.3	0.4	6.7	1.1	5.3	0.9	2.0	0.1
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	36	6	41.09	7.51	2.3	0.3	13.9	1.7	8.8	1.0	8.5	0.6
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	188	77	13.72	1.46	0.8	0.1	3.4	0.1	2.5	0.1	1.7	0.2
Total	281	100	$43.71	$5.60	1.2	0.1	7.1	0.3	5.1	0.2	2.3	0.3

Drug Utilization among Depression Episodes Receiving Five Different Bundles of Care and Beginning in 1972 or 1973

	N	Proportion of Episodes in Each Bundle Receiving the Service: Any Drug Orders	3 or More Drug Orders	1+ Minor Tranquilizer Orders	1+ Major Tranquilizer Orders	1+ Anti-depressant Orders
1. 5+ Mental Health Contacts and 5+ Physician Contacts	1	100	100	100	100	100
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	11	45	27	0	36	27
3. 3-4 Mental Health Contacts	5	100	20	40	0	80
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	6	100	100	33	50	83
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	77	73	26	17	20	51
Total	100	73%	31%	18%	23%	52%

Selected Patient Characteristics in Depression Episodes Receiving Five Different Bundles of Care

Proportion of Episodes With the Given Characteristics

	N	Depression Presenting Morbidity at Index Contact	Chronic or Life-Threatening Illness was Morbidity at Index Contact	Obesity Noted at Index Contact	Anxiety, Other Non-depression Mental Illness at First Contact	No Comorbidities at Index Contact
1. 5+ Mental Health Contacts and 5+ Physician Contacts	15	47	0	7	27	47
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	24	54	8	0	58	33
3. 3-4 Mental Health Contacts	18	67	6	0	39	56
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	36	36	28	19	17	33
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	188	36	21	7	27	21
Total	281	60%	19%	8%	29%	27%

Selected Provider Characteristics in Depression Episodes Receiving Five Different Bundles of Care

	N	Proportion of Episodes With the Given Characteristics: One or More Consultant Contacts	One or More Psychiatrist Contacts	One or More Psychologist Contacts	One or More Social Worker Contacts	One or More Non-psychiatrist Physician Contacts
1. 5+ Mental Health Contacts and 5+ Physician Contacts	15	67	67	47	67	100
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	24	38	46	29	58	58
3. 3-4 Mental Health Contacts	18	39	56	22	56	72
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	36	28	8	11	17	100
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	188	13	6	7	15	92
Total	281	22%	16%	13%	24%	89%

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TABLE 11-41

Specialty of the Index Contact Provider In Episodes of Depression Receiving Five Different Bundles of Care

	N	Proportion of Episodes With the Given Index Contact Provider: Non-psychiatrist Physician	Psychiatrist	Psychologist	Social Worker	Nurse, Physician, Assistant, etc.
1. 5+ Mental Health Contacts and 5+ Physician Contacts	15	73	0	7	20	0
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	24	38	13	13	29	8
3. 3-4 Mental Health Contacts	18	39	22	11	22	6
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	36	97	0	3	0	0
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	188	87	3	3	4	3
Total	281	80%	5%	5%	8%	3%

Contacts by Provider Type in Episodes of Depression Receiving Five Different Bundles of Care

	N	Number of Non-psychiatrist Physician Contacts		Number of Mental Health, Social Worker Contacts		Proportion of Total Contacts with Non-psychiatrist physician		Proportion of Total Contacts With Mental Health or Social Worker	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
1. 5+ Mental Health Contacts and 5+ Physician Contacts	15	11.5	2.2	18.5	3.8	40%	5%	56%	5%
2. 5+ Mental Health Contacts and 0-4 Physician Contacts	24	1.4	0.2	9	1.2	15	3	83	3
3. 3-4 Mental Health Contacts	18	3.1	1.1	3.6	0.1	32	6	68	6
4. 0-2 Mental Health Contacts and 7+ Physician Contacts	36	11.9	1.5	1.0	0.3	90	3	7	2
5. 0-2 Mental Health Contacts and 0-6 Physician Contacts	188	2.7	0.1	0.6	0.1	82	3	14	2
Total	281	4.3	0.3	2.5	0.4	72%	2%	25%	2%

Figure 11-1

AID analysis for 281 episodes of depression; individual utilization measures are used to predict total episode costs. Boxes contain the number of episodes (N), mean dollars per episode (Y), and S.D. for episodes in each group. Parentheses contain the percent of cost variation in each group explained by the given split. Brackets contain the cumulative proportion of variation in cost explained by all prior splits. Large numbers indicate terminations of bundle pathways in order of decreasing costs. Overall mean costs in these figures are different from mean costs reported elsewhere in this analysis, due to cost rounding for AID analysis.

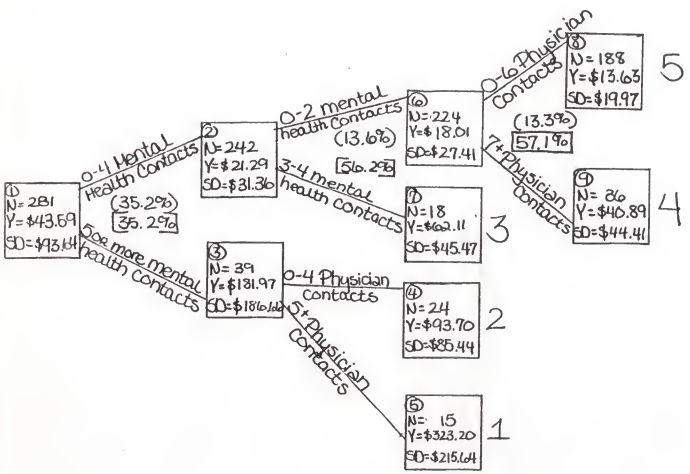

Figure 11-2

AID analysis of 281 episodes of depression, using patient, provider, and medical care process variables to explain variation in episode costs. For explanation of symbols, see Figure 11-1.